amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

VOL. 49, No. 4 APRIL 1981

FEATURED IN THIS ISSUE:

- ★ MORE ON ANTENNA NOISE BRIDGES
- ★ THE EVOLUTION OF A 10 METRE MULTI-ELEMENT BEAM
- ★ NUCLEAR POWER
- ★ THE IMPORTANCE OF SATELLITE COMMUNICATIONS IN DEVELOPING COUNTRIES

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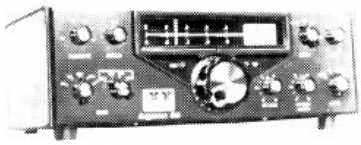

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Cover Photo

At the Victorian Midland Zone Convention, Strathfieldsaye, near Bendigo. Gwen Bloomfield, Kay Fairbairn, Michelle Cartwright and Wendy Hogg getting on with the important part. **See Story, page 46.**

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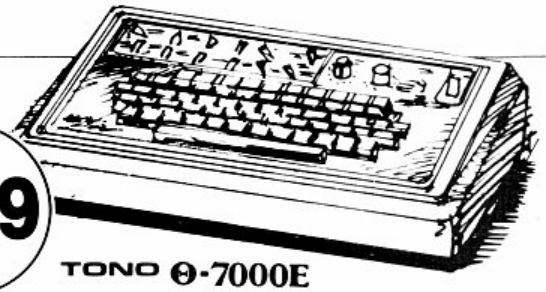

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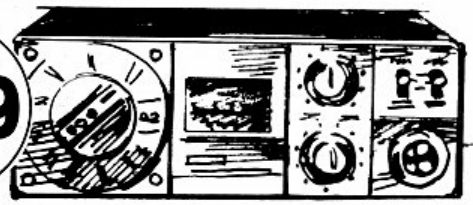

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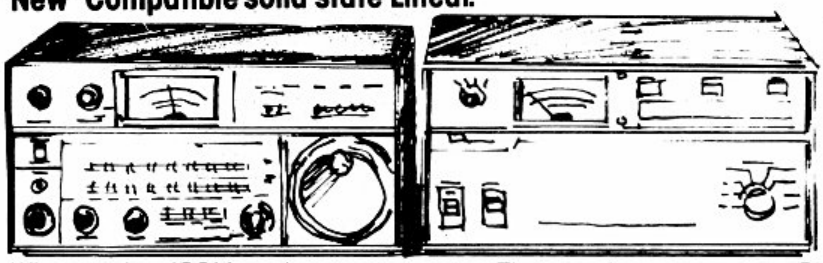
"New" Compatible solid state Linear.



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QSP QSP QSP

A Backward Glance

Just how important is the history of amateur radio and more particularly, how important is the history of it here in Australia? Should we go out of our way to record or preserve this history?

'Old-timers' looking back can gain a sense of achievement, especially if their past was studded with 'pioneering' activities on which they can reflect. The historical researcher seeks to discover that tantalising snippet of information — perhaps overlooked by others, which can cause long-held beliefs to be shattered — or at the least shaken. Often historical achievements can be used gainfully to press a contemporary point. Amateurs have not been backward in relying on the past to press for gains for the future.

In 1985, organised Amateur Radio in Australia will have been in existence for 75 years. Our Institute is the world's oldest Amateur Radio Organisation. Such an anniversary seems to present itself as an ideal vehicle by which we can promote ourselves to the public and perhaps even take a backward glance at those first 75 years.

This issue contains an article by Chris Long, which reveals many fascinating aspects of one man's involvement with the development of radio and television communication in Australia. The late Gil Miles VK2KI deserves a place in the history books; but how many others have short memories already forgotten or worse, how many have even passed on without leaving their part of the jigsaw behind?

It has been suggested that the W.I.A. should prepare a history of Amateur Radio in this country. For many years individuals and representatives of the Institute, both State and Federal, have been preserving the little information that has been forthcoming. Some of this activity has manifested itself as articles in A.R. over the years. To research, collate and prepare a comprehensive history would be a major task for any one individual or even the Institute.

Oral histories are of equal importance, and it is fortunate that Ron Fisher, VK3OM, recorded a short interview with the late Max Howden, VK3BQ, and Arthur Berry, VK3CZ, just before they died. Both Max and Arthur's involvement in Amateur Radio dated back to the early days of international communications. At the December, 1979 General Meeting of the Victorian Division of the Institute, two 'founding fathers' W. K. Witt and T. F. O'Shannessy, both of whom were present at the inaugural meeting of the Amateur Wireless Society of Victoria, told their stories of the early days of Amateur Radio in this country. The stories were tape-recorded. Likewise Chris Long succeeded in recording an interview with Gil Miles before he passed on, and it was largely this recording which enabled Chris to prepare his article.

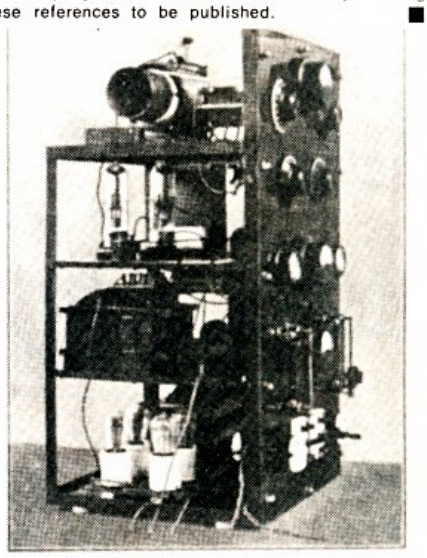
What have you to contribute? How about listening to that old-timer at your club when he next starts to talk about 'the good old days' — better still try to get his story down on tape and do your bit to complete the jigsaw so that our backward glance is not too hazy.

P. WOLFENDEN,
Federal President ■

Gadsden — The First 100 Years

In a centenary book of this name published recently under the authorship of Jules Feldmann there is a reference to the amateur activities of Stanley Wilkinson Gadsden, Governing Director of the J. Gadsden Australia Limited successful commercial packaging enterprises from the death of his father and founder, Jabez Gadsden, in December 1936 through to his death in 1957. Stanley Gadsden was quoted as a widely known pioneer of Australian radio — one of the earlier radio amateurs with the call 3SW. A photograph of his QSL is reproduced and shows the QTH as Kew, which was also recorded in a 1926 call sign list and included in a 1936 call book but with a changed address.

Thanks to Mr. Ronald S. Gadsden, Chairman of the Company and the son of 3SW for permitting these references to be published. ■



With compliments of

S. W. GADSDEN

3SW

NEW ADDRESS: 20 FELLOWS STREET, KEW

Stanley Gadsden's radio call sign and it was widely known to fellow 'ham radio' enthusiasts at home and abroad.

WIANEWS

Several letters received from the Department of Communications to report this month.

Here is the text of 51/1/55 of 25th February, 1981:—

10 MINUTE IDENTIFICATION

"I refer again to your letter of 25 August 1980, in which among other things, you made reference to the identification of amateur stations.

I would like to confirm that in discussions with the Institute, the Department agreed in principle to the interval between 'within transmission' identifications being extended to ten (10) minutes. It is appreciated that this period does not coincide with that stated in the Wireless Telegraphy Regulations and it is intended that at an appropriate time, the Regulations will be suitably modified.

In the meantime, the Department has no objection to amateur stations observing the identification procedure outlined in paragraph 7.2 of the current Amateur Operators' Handbook . . ."

The text of RB4/4/48, also of the same date:—

"APPROVAL FOR AMATEUR STATION LICENSEES TO CONDUCT NARROW BAND VOICE MODULATION (NBVM) EXPERIMENTS.

I refer to our recent discussion on this matter and I have much pleasure in confirming that this approval is now in force. It applies to all Full Privilege Amateurs as well as Limited Amateur Licensees. Novice Amateur Licensees however are not included in this arrangement.

The operation of amateur stations participating in NBVM experiments, should be in accordance with the current conditions applicable to all full and limited privilege amateur stations licensees.

NBVM is recognised as an effective method of speech bandwidth compression which to some extent is still in an evolutionary stage. For this reason, no further minimum technical standards are to be imposed at present and system parameters based on those described in the 1979-81 editions of the ARRL handbook are currently acceptable.

To facilitate recognition of this new form of modulation, each licensee employing NBVM should identify his station during the first twelve months of such operation at not less frequent intervals than once every ten minutes, by employing a normal unprocessed modulation method appropriate to the emission in use. This special identification requirement is proposed for review at the end of a twelve months period.

The Department would welcome feedback from the Institute after a six months period, in terms of advice as to the level of use being made of this system and details of any significant technical development trends which may assist in formulating a new emission standard . . ."

In connection with NBVM it is understood one or two amateurs in VK are conducting experiments at the present time. General observations, principles and technical information for AR would be of great interest.

WIA/DOC JOINT COMMITTEE

Agenda Items for the Convention are still coming in. Those already referred to in last month's WIANEWS are now firm.

A number of Agenda Items have been received from VK4. They suggest that discussions should be held —

(a) on bandplanning for the proposed 50-52 MHz band segment;

(b) on beacon frequency allocations and co-ordination at a Federal level;

(c) on third party traffic with specific emphasis on WICEN activities;

(d) on proposals to change the date of the JMN Field Day Contest to November and to alter the scoring so that two call areas straddle the Tropic of Capricorn.

Others require —

— a report on the efforts being made to make log-keeping voluntary instead of mandatory;

— a discussion on "K" call conditions (with particular reference to increased power on HF, RTTY, FM and SSTV on HF, CW on VHF and increased band segments on HF, for example, 29.0 to 29.4 MHz);

a policy to seek approval for the transmission of music in conjunction with ATV (incidental music as an integral part of training programmes is quoted as an example);

— negotiations to begin for the mean output power of A5 transmissions to be increased to 400W maximum.

Three organisational Agenda Items from VK4 want continuous publicity to be given for the gentlemen's agreements for band usage, more competitive attractions for original technical articles for AR and to confine advertising in one section of AR.

Other Agenda Items believed to be in the pipeline include an approach to be made to replace negation with suitable conditions for the cross-linking of repeaters, the standardisation in a more realistic manner of VK call sign suffix series, establishing proper agreements on frequencies for special modes on HF bands (RTTY, SSTV, etc.), general agreement to re-locate slow morse on 3535 kHz instead of 3550 kHz, to review policy relating to 10m band beacon frequencies (e.g., no beacons below 28.2 MHz or above 28.3 MHz) and discussions to be held on standardised conditions for WIA concessional member grades. It is also possible that the WIA EDP system in relation to the Call Book and WIA Magpubs will be discussed.

1981 FEDERAL CONVENTION

A meeting of the Central Committee was held on 26th February. Examinations were again in the news, including the WIA request to extend the validity of 10 w.p.m. morse test passes by Novice licensees who are attempting to obtain passes in AOCP theory.

"Non-examinable" parts of the Handbook are still being sorted out for early finality.

It appears probable that broad statistics relating to examination performances may be made available after the February exams.

Some time was devoted to discussing the 50-52 MHz band segment in depth, including possible interference to broadcasting stations, particularly under DX conditions.

The use of special prefixes (e.g. AX) was thoroughly discussed and it appears that some headway is now being made to establish suitable guidelines.

WICEN call signs in relation to acceptable abbreviations which could be concessionally approved under all likely situations were discussed.

Intruder Watching was an item which generated considerable discussion, particularly in connection with exclusive amateur bands and also with the "Woodpeckers". The latter is a special target this year for reports by amateurs; see International News in this issue.

EXECUTIVE MEETING

Amongst a host of items received and discussed it was noted that the VK1 Division appear likely to find a keen amateur to undertake the work of Federal Contest Manager for the next three year period from May.

The question of reduced licence fees for pensioners has been raised again with the Minister. A most complimentary reply from the Department concerning the WIA's submissions relating to the proposed Radio Communication legislation has been received. The ARRL's request to the FCC for telephony extensions to certain USA HF bands for some licence classes was raised again but discerning amateurs will doubtless have noted, for example, the response by the RSGB as printed in Radio Communications January 1981 issue. Amateurs in Australia are free to operate their stations on any frequencies within the amateur bands (subject to gentlemen's agreements amongst amateurs themselves) without Government restrictions other than by specific licence conditions

WIANEWS

(novices, repeaters, etc.) and that a similar absence of restrictions applies to most other countries. There are many other aspects to this matter.

EXAMINATIONS — REMOTE AREAS

The relevant text of a letter from the Minister to a member is printed here, although this question has been publicised in AR before (e.g. AR October 1978). After stating the specal arrangements made for this country area examinee the Minister wrote —

"You will no doubt be pleased to learn that special examinations may now be conducted in capital cities and at district offices for any candidate who resides more than 80 km from the nearest office of my Department's Radio Frequency Management Division. Radio inspectors may also conduct special examinations in remote areas during routine visits. This will allow some candidates whom would otherwise encounter difficulty in attending the main centres, to contest examinations closer to home.

With the exception of very special circumstances, Novice Amateur Operators' Certificate of Proficiency (NAOCP) examinations are not held at country post offices. Although the Postal Commission has agreed to continue providing examination facilities for both the full and limited classes of amateur certificate, no such agreement has been reached in regard to the novice examination.

Consideration has been given to expanding the use of pre-recorded telegraphy tests as part of the AOCP examination. Unfortunately, Postmasters who do not have morse qualifications are reluctant to supervise such tests. Furthermore, as I am sure you will appreciate, the provision of suitable monitoring facilities may also present special difficulties, particularly in those instances involving several candidates.

You may be assured that my Department will continue to maintain flexibility in meeting the needs of examination candidates from remote areas."

"C" CALLS

Letter 51/1/55 of 13th February from the Department advises the proposed changes relating to the issue of "C" calls as foreshadowed in WIANEWS in last month's AR. After pointing out that only the Department has the authority to change any part of a call sign assigned by them, the letter states that when the holder of a "C" call sign moves interstate temporarily the normal procedure of mobile identification shall apply — i.e. "VK3CCC mobile 2 at Albury". It appears to follow therefore that if the holder of a "C" call sign transfers interstate the procedures in paragraphs 6.14 and 6.19 of the Handbook apply.

The letter concerned continues:—

"With regard to the Department's existing policy concerning 'C' calls, your query also raises the question of whether continuation of the existing 'C' calls concept is justified. The Department feels that the original need for such calls has been largely nullified by the recent granting of more liberal portable and mobile operating conditions.

Additionally, the Department is conscious of the fact that it cannot extend the 'C' call concept to other than full privilege amateur licensees and also seriously doubts whether the benefits of maintaining this system justify the Departmental effort and additional system complications involved . . .

Accordingly, it is proposed that the 'C' call series should be made available for general allocation. Existing 'C' call allocations would, of course, remain so as not to disadvantage any existing licensee."

THIRD PARTY CANADA

The text of letter RB4/4/6 of 13/2/81 from DOC is published hereunder for information.

"Further to previous correspondence on this topic, I wish to advise that following an exchange of letters, a special agreement, pursuant to Article 41 of the International Radio Regulations, now exists between this Administration and the Administration of Canada, concerning third party traffic between amateur stations.

Consequently, it is now permissible for amateur stations of Canada and Australia, duly licensed in accordance with the legislation in force in these two countries, to exchange messages or other communications from or to third parties provided:

(a) the amateur stations exchanging such third party communications are not paid any direct or indirect compensation for them; and

(b) such communications are limited to conversations or messages of a technical or personal nature, for which by reason of their unimportance, recourse to the public telecommunication service is not justified . . .

I might add that an approach has also been made to the United States of America in relation to third party traffic. I will advise you when an agreement is completed."

SPECIAL CALL PREFIXES

And finally, of the letters, here is the text of DOC letter 4/8/1 of 25/2/81:—

"I would like to confirm verbal advice that the call sign suffixes from WIA to WIZ associated with the prefix VK have been reserved in all States for use by stations of the Wireless Institute of Australia."

HISTORICAL BOOKS

There is a possibility that the Institute might acquire for re-sale a few copies of the historical amateur radio books "Two Hundred Metres and Down" and "Fifty Years of ARRL". The former was printed by the ARRL in 1936 and the latter in 1965. The price would be $4.50 each plus postage on 300g each and orders will be processed strictly on a "first come first served" basis.

A Review of Antenna Noise Bridges Part 2

Bob Slutzkin VK3SK
8 Lynedoch Ave., Balaclava 3183

This part of the article was submitted as an appendix to the first part which appeared last month. It contains much interesting data and discussion on factors of interest to the serious user and constructor of rF noise bridges. The author has submitted an article describing a noise bridge which, as a result of the research associated with this article, gives a professional level of performance using amateur techniques. The concluding part of the article will appear next month.

1. THE RF PERFORMANCE OF POTENTIOMETERS

POTENTIOMETERS

With the help of K4CX, W6BXI and others, some impedance measurements were made on a number of composition potentiometers as used in noise bridges as the component, Rv. Laboratory rf bridges were used to measure Rp and Cp for different settings of the potentiometers, and the results are summarised in the Table of Fig. 5, and entered on to the graph paper to enable a curve to be fitted.

The tests showed that for each potentiometer there was a setting which would produce a non-reactive reading which remained non-reactive over the whole HF spectrum, and in each case this setting was very close to 130 ohms (irrespective of the size or make of the component). For settings above 130 ohms Cp readings would be unaffected by frequency; and for those from 130 down to about 25 ohms the inductive (—Cp) readings were also constant with frequency.

Supposing the strays in the potentiometer consist of a small amount of series inductance, L, and a small amount of shunt capacitance, C, with L and C both unaffected by changes in the potentiometer setting, R. Then the admittance of the component would be:

$$Y = (R - jwL)/(R^2 + w^2L^2) + jwC$$

and for values of R and f which would make wL very much smaller than R, w^2L^2 would be of second order of smallness, to allow the use of the approximation:

$$Y \approx 1/R + jw(C - L/R^2).$$

This is the expression for the admittance of the parallel combination of a resistance, R, and capacitance $(C - L/R^2)$. Giving C the value of 1.8 pF and L the value of 0.03 uH in the approximate equation, produces the curve which can be seen to very nearly fit the points plotted in Fig. 5.

The correlation between the measured data and the curve is sufficient to indicate that the above supposition is fairly close; so that we may assume that a composition potentiometer, when wired as shown in the sketch of Fig. 5 will behave as a variable pure resistance in series with an inductance of about 0.03 uH and shunted by a capacitance of about 1.8 pF.

TABULATION OF MEASURED VALUES OF Cp

Rp	16	25	30	50	60	100	130	150	200	230	250
Cp	—67	—30	—36	—11	—7.7	—1	0	.3	.8	1.2	2.7
range	—78	—34	—45	—12	—8.6	—1.5	0	1	1.5	1.3	2.8

By courtesy of K4CX and W6BXI

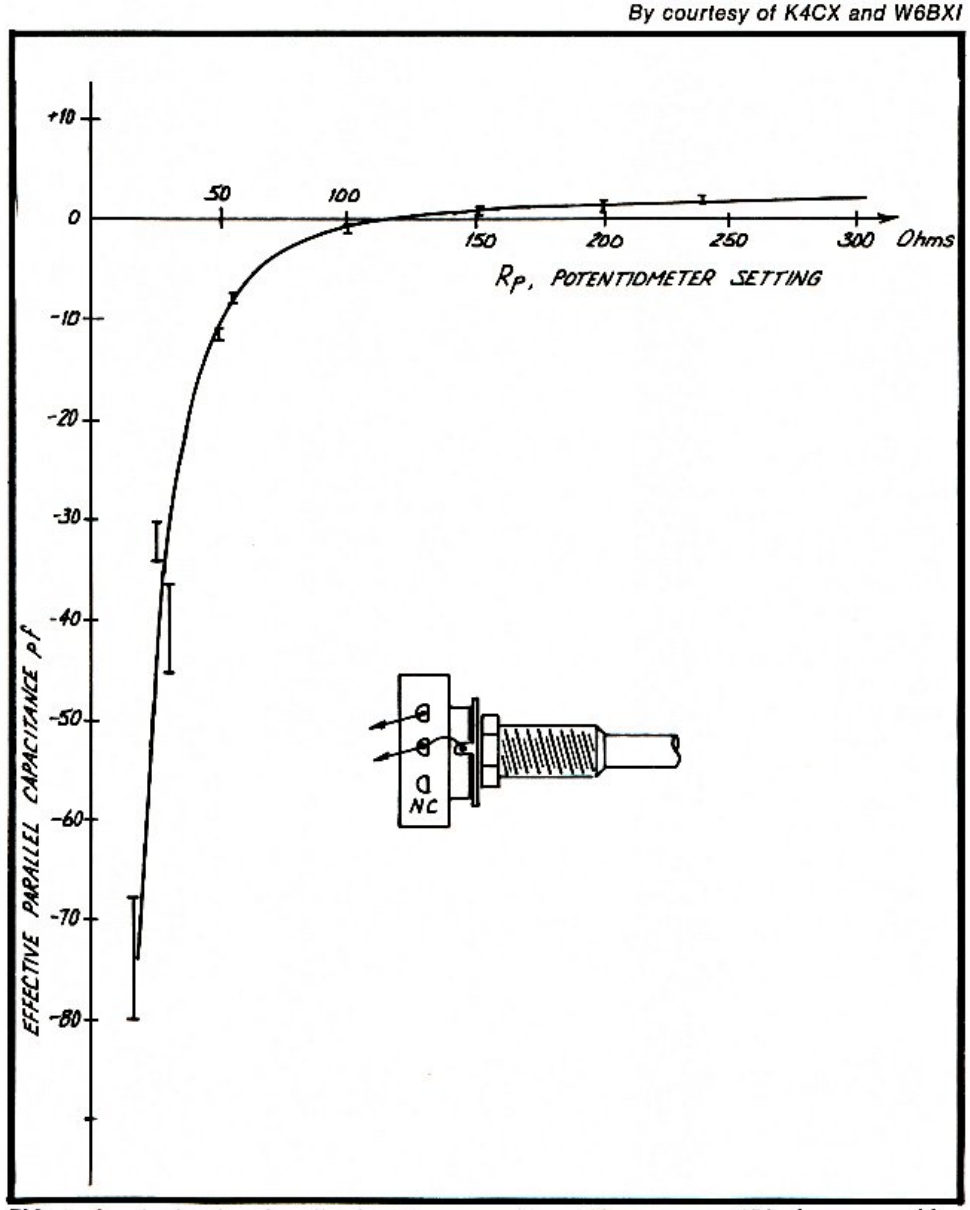


FIG. 5: Graph showing the effective stray capacitance, Cp, across a 250 ohm composition potentiometer, for different settings. The curve Cp = C — 10^6L/R^2, with C = 1.8 pF and L = .03 uH, shows reasonable agreement with the measured values of Cp. The measured values are shown as vertical bars, centred on the value measured, and length equal to the uncertainty of the measurement.

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CUSHCRAFT A3 YAGI 10-15-20M 1KW 3 el 14' boom 8db gain VSWR<1.2:1	$250
HY-GAIN TH3-JR YAGI 10-15-20M 600W PEP 3 el 12' boom 8db gain VSWR<1.5:1	$215
HY-GAIN 153-BA YAGI 15M 1KW 3 el 12'2" boom 8db gain VSWR<1.25:1	$110
HY-GAIN 18-AVT/WBa 10-80M VERTICAL 29' tall self supporting	$100
HY-GAIN GPG-2 2M VERTICAL 5/8W co-linear 3-4db gain	$20
HF HELICAL WHIPS 10-15-20-40 & 80M with adjustable tips	each $22

PLUS SPECIAL PRICE FOR SET OF WHIPS WITH ASAHI TYPE BUMPER MOUNT & SPRING

ROTATORS

NOTE: All rotators come complete with bottom bracket and suitable for 28V AC operation

KEN KR-400 MEDIUM DUTY BRAKE POWER 1300 in/lbs	$120
KEN KR-500 VERTICAL ROTATOR 180° elevation	$130
CDE HAM-IV HEAVY DUTY BRAKE POWER 5000 in/lbs	$205
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Proprietor - ROY LOPEZ (VK2BRL)

2. THE PERFORMANCE OF CAPACITORS AT HF

All capacitors contain some stray series inductance; and this causes changes to occur in the apparent capacitance as the frequency is changed.

Let $w = 2\pi f$ (F in MHz),
Let $w = 2\pi f$ (f in MHz),
L the stray inductance in uH,
C the actual capacitance, and
Ca the apparent capacitance both in pF.

Then:

$$Ca = \frac{C}{1 - 10^{-6}w^2LC}$$

The graphs in Fig. 6 show how the apparent capacitance of various fixed capacitors varies with frequency. At the low end of the HF spectrum, it can be seen that moderate strays are no problem, whilst at the higher frequencies small strays can cause serious changes in apparent capacitance. The rise in apparent capacitance is steeper with larger capacitors, and series resonance will occur when $w^2LC = 10^6$.

An approximation for the equation above may be used for the shallow part of the curves. It is $Ca \approx C + 10^{-6}w^2LC^2$ (when $10^{-6}w^2LC$ is much smaller than 1).

It is difficult to predict the value of stray inductance in a capacitor, and impossible to avoid it, so we must live with it. If we keep the value of capacitors down to the minimum needed, we can reduce the effects of the strays.

In the noise bridge, steps can be taken to balance out the stray inductance in one arm of the bridge by deliberately adding inductance to another arm — the process described as equalization.

3. ANALYSES OF THE R-X NOISE BRIDGES

(a) THE SERIES BRIDGE

This is an adaptation of the Wien Capacitance Bridge. The Capacitor, Ck, added to the Wien bridge circuit allows both capacitive and inductive reactances to be measured. Referring to Fig. 1d (see Part 1):

Neglecting the markings of the Cv dial for the moment, at balance,

$$Z3 = Z4$$

i.e. $R3 + jX3 = R4 + jX4$

$Ru + jXu - jXk = Rv - jXv$,

where Xv is the reactance of Cv etc.

Equating reals, then Imaginaries,

$Ru = Rv$

$Xu = Xk - Xv$

$= 10^6/(wCk) - 10^6/(wCv)$ (using pF and MHz)

In the Palomar bridge, the first term becomes 2270/f (in MHz) and in the MFJ 202, the first term becomes 1060f (in MHz).

The value of Xu may also be expressed as:

$$Xu = 10^6(Cv - Ck)/(wCvCk)$$

Note: The dial markings for Cv are in pF either side of a central zero, where Cv = Ck. For lower values of Cv the graduations correspond to Ck — Cv, and that quadrant is labelled "Xc". For higher values of Cv the graduations correspond to Cv — Ck, and that quadrant is labelled "XL". For mathematical convenience, I shall call the dial reading at any setting, "Cd", so that Cd = Ck — Cv, and in the XL quadrant, the dial readings will be considered as negative.

Now, the above equation can be expressed in terms of Cd, and for the Palomar, $Xu = 2270\ Cd/(f(70 - Cd))$, and for the MFJ $Xu = 1060\ Cd/(f(150 - Cd))$.

Graphs based on these equations, and with f = 1 are compared in Fig. 7. The appropriate graph may be used for quick conversion into Xu by dividing the quantity obtained from the graph by the frequency of measurement.

The analysis above assumed the bridge components to be perfect, and did not allow for strays. There will be stray series inductance in the components and in their leads, and stray shunt capacitance within the components and to ground. All strays can be compensated for, in one shot, by placing a small amount of inductance in series with one arm of the bridge, adjusted so that the bridge will balance against a 50 ohm dummy load at both 3.5 MHz and 30 MHz without any change in the Cv setting. In theory, changes in Rv after that would upset the compensation, but in practice the effect should be very small over the HF bands and over an R range of 25 to 150 ohms.

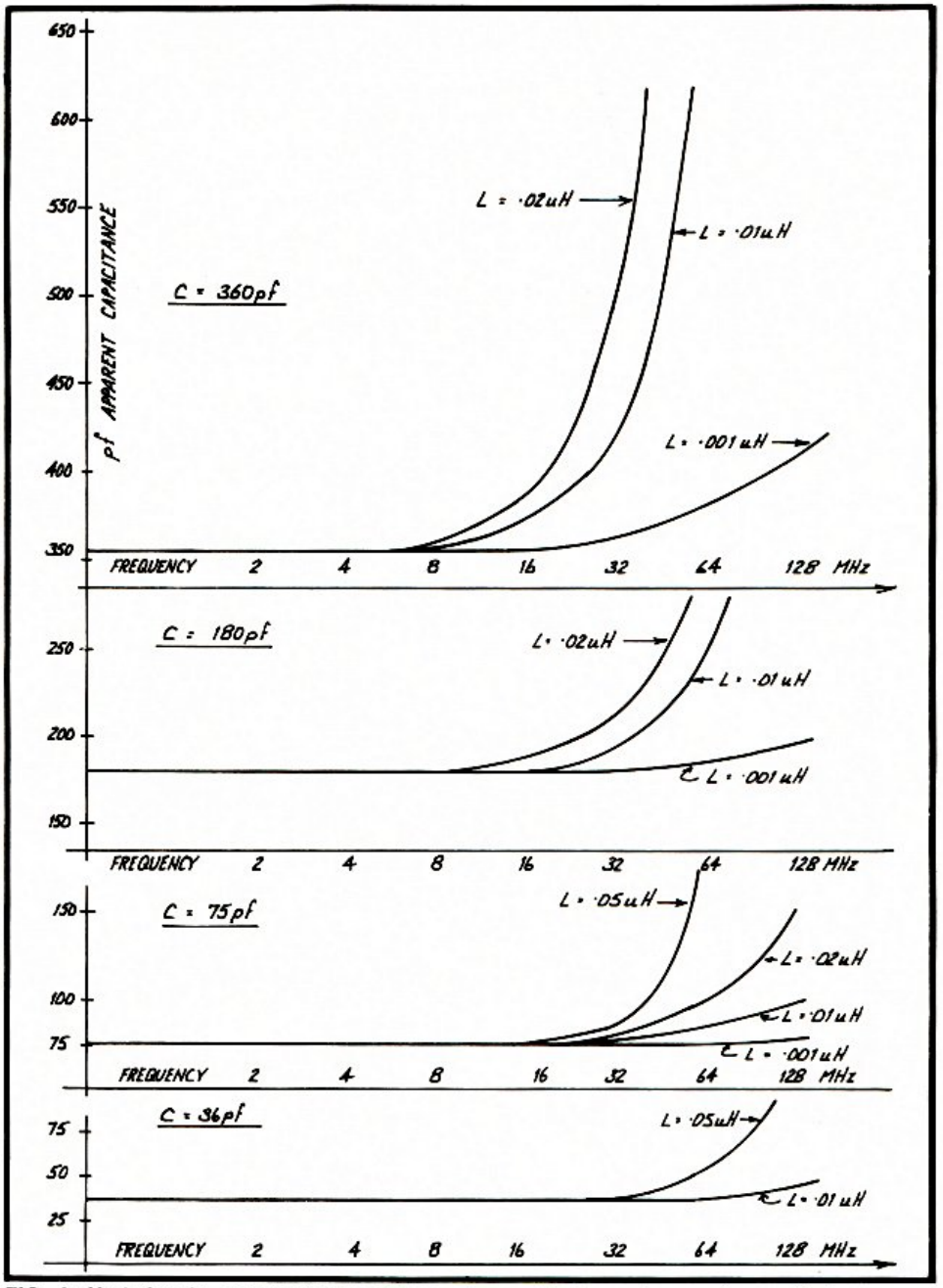

FIG. 6: Variation in apparent capacitance of several sizes of capacitors with frequency, due to stray inductance L (calculated from: $Ca = C/(1-10^6W^2LC)$.

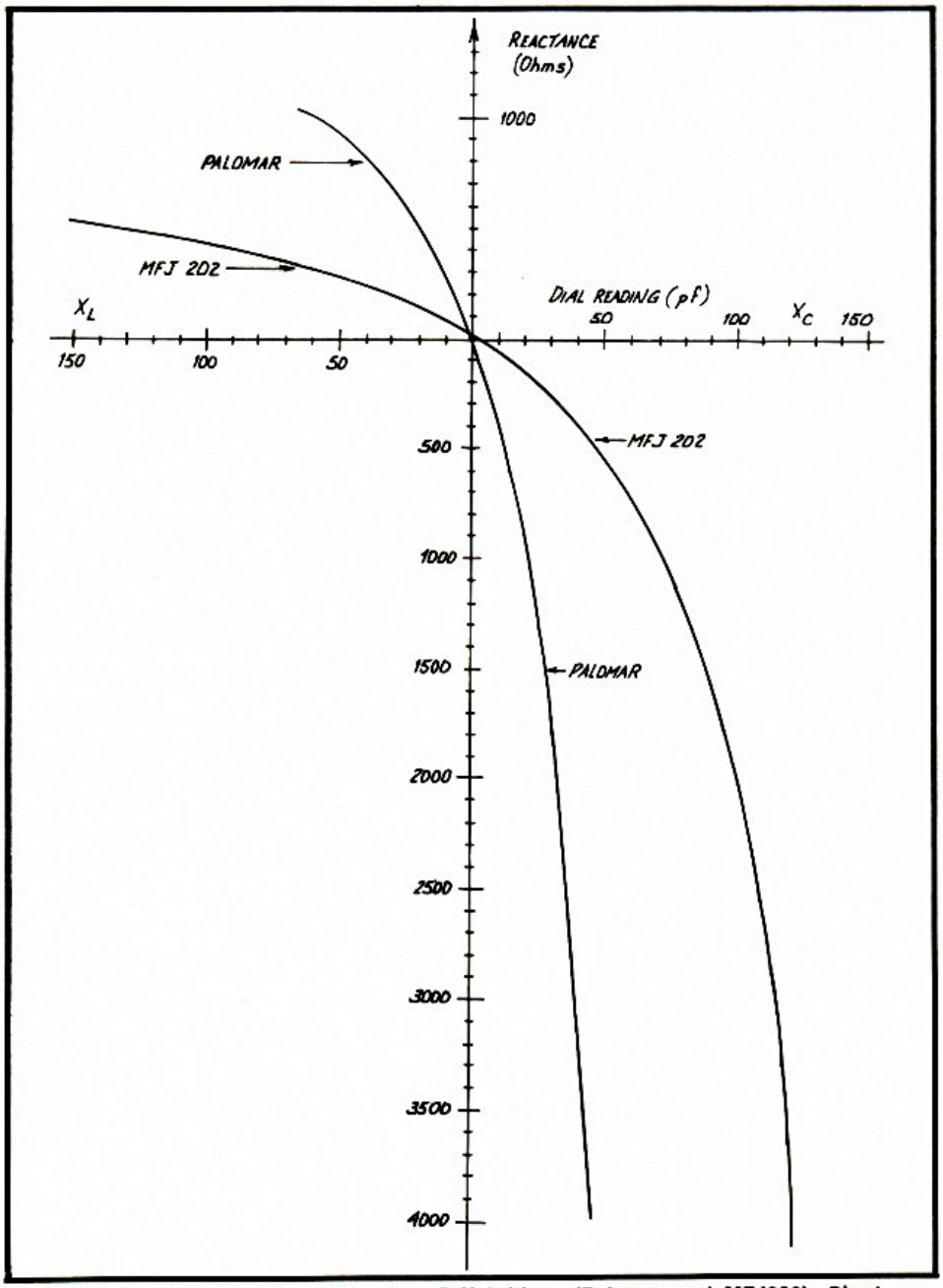

FIG. 7: Conversion chart for series type R-X bridges (Palomar and MFJ202). Chart converts dial reading on bridge into ohms reactance for 1 MHz. This value to be divided by frequency of measurement in MHz.

NOTE: These graphs differ from those in the instruction sheets of the Palomar and MFJ bridges: (a) the scales have been changed; (b) the graphs have been inverted to conform with convention (that capacitive reactance is negative) and to agree with the mathematics used in this appendix.

The sensitivity of the X dial is the big problem in this bridge. At the low frequencies, a very small movement of the dial is needed to cover a significant change in reactance indication. For example, in the Palomar bridge when measuring exactly 50 ohms, rotation of the Cv dial by 1 degree causes only .078 pF change, but at 3.5 MHz this is sufficient to indicate 7.2 ohms capacitive reactance. Less than 5 degrees angular rotation is sufficient to cover the full range of capacitive reactance for a 2 : 1 SWR. These angles may be doubled approximately for the MFJ bridge; but in either bridge this order of sensitivity is too high for reliable and accurate readings to be obtained near resonance at the low frequencies, and the situation becomes worse as capacitive reactance measurements are made. Parallax errors in the order of 1 or 2 pF might be difficult to avoid on these bridges, and it has just been demonstrated that even this magnitude of error is series. Another way that this effect is felt is that an unsuspecting operator may be pleased that his 80 metre antenna balances beautifully with the dials set to near 50 ohms and *near to X = 0.* With parallax error and all, his antenna system may be well off resonance, and the SWR close to 2 : 1.

It is a pity that a notation has been adopted for the series R-X noise bridges which is fundamentally incorrect, and that two commercial manufacturers of noise bridges are perpetuating the error. The X dial has a central zero to indicate resonance, with XL and Xc quadrant marked on either side. So far this is quite correct. The error occurs in the designation of pFs either side of zero. Mathematically, Cv is in series with —Ck, and this cannot be represented correctly by Cv — Ck. If the dial is to be graduated in pFs, it should be either graduated in terms of Cv (and the equations and graphs modified to suit) or in effective series capacitance, Cs, which would be equal to CvCk/(Cv — Ck). Either would be fundamentally correct, but the second alternative is rather inconvenient, because at resonance Cs = ∞, and close to resonance the values are very high, which makes calibration difficult. The scale could be graduated in terms of 1/Cs to overcome this problem, but to go one step further and graduate in ohms reactance for 1 MHz would be a better solution (perhaps a second scale showing actual values of Cv could be included to allow the use of the MFJ type range extender).

(b) THE PARALLEL R-X BRIDGE

The Cv dial markings of this bridge are similar to those of the series type, with a central zero, when Cv = Ck, but with the higher values of Cv marked +pFs, and the lower values marked —pFs. If we call the dial reading Cd, then the equation:

$$Cd = Cv - Ck$$

satisfies normal conventions.

The mathematical analysis is tidiest in terms of admittance. In Fig. 1e, (see Part 1), the requirement for balance is:

$$Z3 = Z4 \text{ (in terms of impedance)}$$

i.e. $Y3 = Y4$ (in terms of admittance)
and Y3 comprises Yu and Ck in parallel and Y4 comprises Gv and Cv in parallel (Gv being 1/Rv),

therefore

$$Yu + jBk = Gv + jBv$$

(Bk, Bv and Bd being the susceptance of Ck, Cv and Cd)

so that

$$Yu = Gv + j(Bv - Bk)$$
$$= Gv + jBd$$

(the admittance of Rv and Cd in parallel).

Using MHz, mS and pF, we have

$$Yu = 1000/Rv + j\pi fC/500.$$

Of course, the Rp and Cp readings may be used to first calculate Xp and then find the impedance in terms of R + jX using the equations set out later in this section; or the admittance may be determined first, and then converted to impedance if needed.

The above analysis assumed that there were no strays in the bridge circuit. In practice, there will be stray inductance in the components and leads, and stray capacitance across the components. The stray capacitance is of no consequence, because it causes a constant error which is nullified when the bridge is calibrated. Equalization looks after the stray inductance, and the method described by W6BXI and W6NKU in February 1977 Ham Radio is excellent.

The notation Rp and ± Cp is not unacceptable mathematically (although conductance (G) and Cp would be tidier). The sensitivity of the C control is no problem in the parallel type bridge; i.e. small changes in Cp cause only small changes in reactance values, and we find that at 30 MHz (where the parallel type bridge is most sensitive) a measurement error as great as 10 pF will produce a reactance error so small that the resulting SWR error will be 10 per cent or less.

4. NOTES ON RESIDUAL NOISE

The following notes explain how receiver intermodulation and spurious response can produce residual noise to interfere with noise bridge measurements.

When two or more signals of different frequency pass through a non-linear device, the signals modulate each other to produce "Intermodulation Products" which contain all the possible combinations of the sums and differences of the fundamentals and the harmonics of the signals. The intermodulation products of an SSB transmission's component frequencies can cover a wide spread of frequencies either side of the original sideband, and superimposed on it. We are all familiar with the result; distortion on the signal and splatter on either side. This intermodulation can occur, and so often does occur, in the transmitter as a result of it being either wrongly adjusted or driven too hard, or both. But often the intermodulation occurs *in the receiver*, because *it* is being driven too hard by a strong signal from a neighbouring ham, although most of us are inclined to blame the other fellow. Some receivers are better than others, and a lot of receivers would be over-driven by a signal of S9 + 30. If we are tuned to a weak signal, and our neighbour opens up with a clean 9 + 30 signal just to one side, we could receive his splatter due to our receiver entirely. Supposing the whole band in which we are operating is full of such signals, all S9 + 30 and all interfering with each other, except for the one little slot where we are listening. The total splatter signal in that slot would be very much stronger than from just one signal. Now if we were to replace all these strong signals with a wide-band noise of level S9 + 30 over the entire band, except for that one slot to which the receiver is tuned, we have the situation that exists when a noise bridge is balanced for the measurement of a resonant device, such as an antenna. (The noise spectrum fed to the receiver is shown in Fig. 3b.) The result of all the intermodulation products of all the component frequencies of the noise would appear as residual noise over the entire band, but noticeable *only in the slot*. This is not something new, found only in noise bridges. One of the performance tests on multi-channel telecommunication systems is to feed a broad-band noise signal, first through a slot filter, and then through the system, and to measure the intermodulation noise at the slot frequency at the other end.

Spurious response of a receiver means the response of the receiver to images, mixer products, IF filter spurii (or "pop-ups") and even IF feed-through. The ARRL Handbook (p. 245 of the 1977 edition) gives a chart of all the mixer products of a superheterodyne that can produce spurious responses (and at more frequencies than most of us would realise). The specification of many an amateur band receiver contains claims spurious rejection of better than 50 dB (and we will see claims of better than 70 dB in some specifications). Experts tell me that many receivers are sold which do not come near this standard, and that quite a number of published specifications are misleading in this area. But what is the effect that spurious response has on a noise bridge measurement? Referring again to Fig. 3b (Part 1), assume the receiver is tuned to the slot in which there is no signal at all, but that the receiver is responding to the noise from the bridge at any number of spurious frequencies (of course reduced by the amount that the receiver can in practice reject spurii). These will add up and appear in the output of the receiver, but will be *indistinguishable from a noise which might have been directly received on the frequency to which the receiver is tuned*. There is one further complication. The noise output from any broad-band source tends to drop off towards the band edges. For example, one noise source that I built up had an output on ten metres which was 20 dB down on the level on all the other HF amateur bands. This type of thing will exaggerate the receiver's response to lower frequency spurii during noise measurements on ten metres.

The receiver's intermodulation and spurious performance can thus combine to produce residual noise to mar the accuracy of balance in noise bridge measurements.

"Leakage around the bridge" perhaps needs a little explanation. Some noise bridges are not shielded at all (for example the TE7-01) and some receivers are poorly shielded. It is possible for noise from the noise source to find its way into the receiver without passing through the bridge, either due to poor shielding or via earth loops inside the instrument. The difficulty is that it requires only a small amount of leakage to interfere with a sharp deep null. We should expect good communications receivers to be sufficiently well shielded for use even with a TE7-01 with its massive noise output and no shielding, just as we would expect the basic receiver noise to be no problem. But these are matters which must not be forgotten if we ever commandeer a portable all-waver for noise bridge measurements outside the range of our amateur-band-only receiver.

5. IMPEDANCE MATHEMATICS

The expression, $Z = R + jX$ is the common form of stating impedance, namely as a *series* combination of resistance and reactance. For the time being, I shall add the suffix s, making the expression $Z = Rs + jXs$ to designate that it *is* a series combination. Another arrangement would be possible, a *parallel* combination o fRp and Xp, which would have identical impedance to $Rs + jXs$; but the values of Rp and Ss would differ, as would the values of Xp and Xs. The impedance of the parallel combination would not be $Z = Rp + jXp$ but would be in a more complicated form. The equivalent Rs and Xs values of a parallel Rp, Xp combination can be calculated from the equations:

$$Rs = RpXp^2/Rp^2 + Xp^2$$

and

$$Xs = XpRp^2/Rp^2 + Xp^2$$

To find the parallel equivalents of a series combination:

$$Rp = Rs + Xs^2/Rs$$

and

$$Xp = Xs + Rs^2/Xs$$

There are a few simplifications possible: Xs/Rs is the Q of a circuit, and this equals Rp/Xp. If we are looking at either parallel combinations or series combinations, the quantity $X/R + R/X$ will equal $(Q + 1/Q)$, which I shall call Q'. Then:

$$Rs = Xp/Q' \text{ and } Xs = Rp/Q'.$$

Also:

$$Rp = XsQ' \text{ and } Xp = RsQ'.$$

These are equations that are easily memorised.

There are simpler approximations which can be used under certain circumstances. If Q is 10 or greater, $Q' \approx Q$ to within 1 per cent; and if Q is 0.1 or less $Q' \approx 1/Q$ to within 1 per cent. I shall leave it to the reader to develop approximations for the above equations in the case of high Q or low Q circuits.

6. ADMITTANCE — AN ALTERNATIVE NOTATION FOR PARALLEL CIRCUITS

Although Rp and Xp cannot be expressed as $Rp + jXp$, their *reciprocals* may be expressed in that form.

The reciprocal of resistance is *conductance* the symbol for which is G; and $G = 1/Rp$.

The reciprocal of reactance is *susceptance* the symbol for which is B; and $B = -1/Xp$ (note the negative sign).

The algebraic sum of these two is known as *admittance*, the symbol for which is Y; and we have the general expression:

$$Y = G + jB.$$

The basic unit for Y, G and B is siemens — denoted S (which is capital S to differentiate it from small s for seconds). The unit mhos (ohms spelt backwards), now obsolete, might still be found in some texts. Millisiemens (mS) is the practical unit used in antenna work, and the conductance of 50 ohms of resistance is 20 mS.

Using ohms and mS:

$$G = 1000/Rp \text{ and } B = 1000/Xp.$$

The susceptance for an inductance L uH is $B = -1000/2\pi fL$ mS (with f in MHz) and of a capacitance C pF is

$$B = 2\pi fC/1000 \text{ mS (f in MHz).}$$

The similarity between these and the reactance equations is obvious, but the inversions and change in signs should also be noted.

There are many occasions when it is simpler to calculate the parameters of a parallel circuit in terms of admittance; and one important case is that of the parallel type noise bridge.

The impedance of a circuit of known admittance, or the admittance of a circuit of known impedance can be calculated from the following equations:

(a) in basic units (ohms and siemens)

$$Y = G + jB = R/(R^2 + X^2) - jX/(R^2 + X^2)$$

and

$$Z = R + jX = G/(G^2 + B^2) - jB/(G^2 + B^2)$$

(b) in practical units (ohms and mS)

$$Y = 1000R/(R^2 + X^2) - j\,1000X/(R^2 + X^2)$$
$$Z = 1000G/(G^2 + B^2) - j\,1000B/(G^2 + B^2)$$

Some useful reminders:

A short circuit has zero impedance but infinite admittance.

An open circuit has infinite impedance but zero admittance.

The result of several admittances in parallel is the sum of their conductance plus j times the algebraic sum of their susceptances. Impedances in series may be added in the same way; but admittances in series or impedances in parallel are calculated by the "reciprocal of the sum of reciprocals" rule.

50 ohms is the equivalent of 20 mS.

7. PARALLEL CAPACITANCE

In some RF bridges, as in the parallel R-X noise bridge, the dials are marked in Rp in parallel with Cp; but Sp can have positive or negative values. Positive pF readings would be understood by all of us, and we could easily calculate the value of capacitive reactance Xp in parallel with Rp, and then convert into series equivalents to obtain the impedance in terms of R + jX.

What about a negative pF reading? It must be obvious to most that this would have to indicate inductive reactance; but what may not be so obvious is that the —pF value obtained from a bridge measurement is the capacitance which would be needed to make the circuit being measured resonant. It is sometimes called "the resonating capacitance". We know that in a resonant circuit the capacitive reactance is equal and opposite to the inductive reactance, so that the two cancel out. The capacitive reactance is calculated from the formula $X = -1/2\pi fC$. If we have a resonating capacitance with a negative sign, we could use the same equation, and finish up with a positive reactance, which is effectively an inductive reactance calculated from the equation for capacitance. This is precisely what we do; so when we have a reading of Rp and ±Cp we may calculate Xp using the capacitance equation, and then calculate the impedance, allowing the sign of the reactance to indicate whether it is capacitive or inductive.

There are many occasions when we need not do all this. We can sometimes obtain sufficient information from a Rp and Cp reading, e.g. a 50 ohm line to the transmitter measures at 14 MHz 68 ohms Rp and +160 pF Cp. If the loading capacitor of the final pi coupler can accommodate it, we can detune it down by the 160 pF, and the final will be looking at a pure 68 ohms, without blushing.

If we were to look at this example from the admittance point of view we have:

$$G = 1000/68 = 14.7 \text{ mS, and}$$
$$B = (2\pi 14 \times 160)/1000 = 14.1 \text{ mS}$$
$$\text{so } Y = 14.7 + j14.1 \text{ mS.}$$

Normalised admittance for the Smith Chart (for 20 mS, i.e. 50 ohm line) is:

$$Y = 0.735 + j0.7$$

which when plotted on the Smith Chart indicates an SWR of 2.4 : 1 and an impedance of 36 — j34 ohms (see Fig. 8).

We may have calculated this using Rp and Xp:

$$Rp = 68 \text{ ohms and}$$
$$Xp = -10^6/2 \times \pi \times 14 \times 160 = -71 \text{ ohms}$$
$$Q' = -68/71 - 71/68 = -2$$
$$Rs = Xp/Q' = +71/2 = 36 \text{ ohms}$$
$$Xs = Rp/Q' = -68/2 = -34 \text{ ohms}$$
$$Z = 36 - j34 \text{ ohms . . . confirming}$$

Smith Chart calculations. However we calculate it, an SWR of 2.4 : 1 would be considered high by most amateur operators, yet when looking at it from the point of view of Rp and Cp, we can see that this impedance would load the final beautifully if the output capacitor of the pi coupler can be detuned by the required amount. The losses in the coax cable at this frequency due to an SWR of 2.4 : 1 in most installations would be negligible.

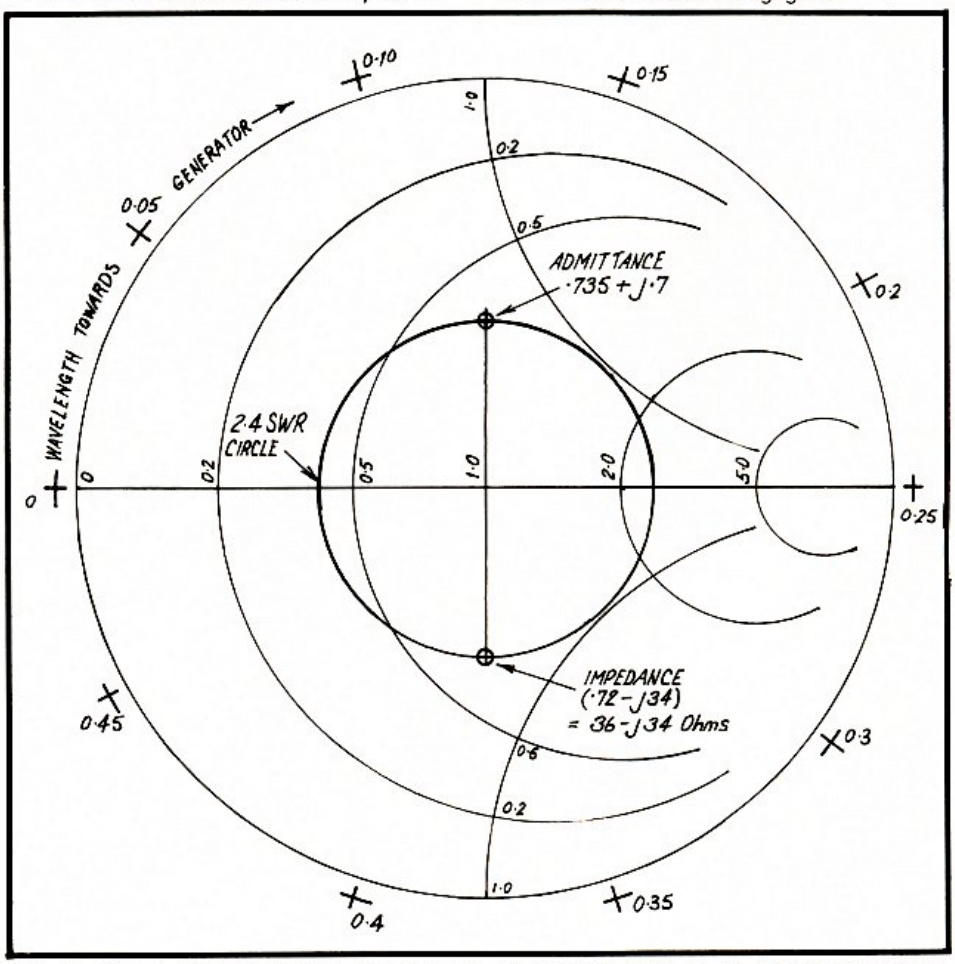

FIG. 8: Plot of Rp = 68 ohms parallel with Cp = 160 ohms at 14 MHz in a 50 ohm co-ax system. Admittance plotted first, then SWR circle drawn, and then impedance found diametrically opposite on circle.

This example has shown:

1. The advantage of working in Rp and Cp.
2. The advantage of working in admittance for parallel circuits.
3. That the SWR does not give the full story.

8. RANGE EXTENDER AND DUMMY LOADS

For the convenience of readers, the drawing from page 522 of the 1977 ARRL Handbook showing how to make a dummy load in a PL259 plug is reproduced in Fig. 9. To keep stray inductance to a minimum the pin of the plug should be filled with solder and not just soldered at the tip. Also the shank should be shortened to keep the pigtail at the back as short as possible. Applying heat so close to the body of the resistor might alter its value slightly. Because of this possibility, it is perhaps a waste of time selecting accurate values for these devices. If they can be measured accurately after completion that will be better; and it is of little consequence if the ohmic value finishes up some odd figure, so long as it is known. Depending on the accuracy needed, it is a good idea to check the values again a year or so later, as the values can drift with time, particularly after being overheated.

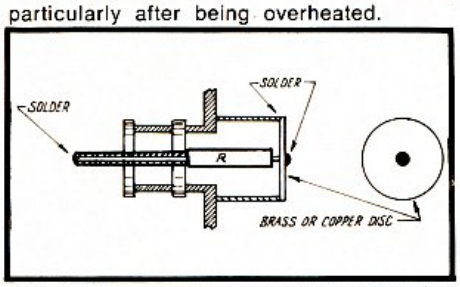

FIG. 9: Dummy antenna made by mounting a composition resistor in a PL-259 coaxial plug. Only the inner portion of the plug is shown, the cap screws on after the assembly is completed.

EDITOR'S NOTE:

Although the author has indicated that the series type bridge has shortcomings, experience has shown that in practice the series type bridge is a more accurate instrument and that the deficiencies can be overcome.

In a parallel bridge of a type easily constructed by an amateur there is a stray inductance of 0.3 uH associated with the potentiometer. This cannot be completely compensated for and represents an inductive reactance of 56.5 ohms which is not acceptable.

In a series bridge of a type easily constructed by an amateur there is some stray capacitance which may be less than 5 pF, which represents a reactive of 1061 ohms, which is not critical for most measurements. The residual inductance can be compensated for. Hence in a following article the author describes a series type bridge which is designed so as to minimise the problems of strays, etc., and which operates into the low end of the VHF spectrum with good accuracy. ■

Vale Gil Miles VK2KI (Vale History?)

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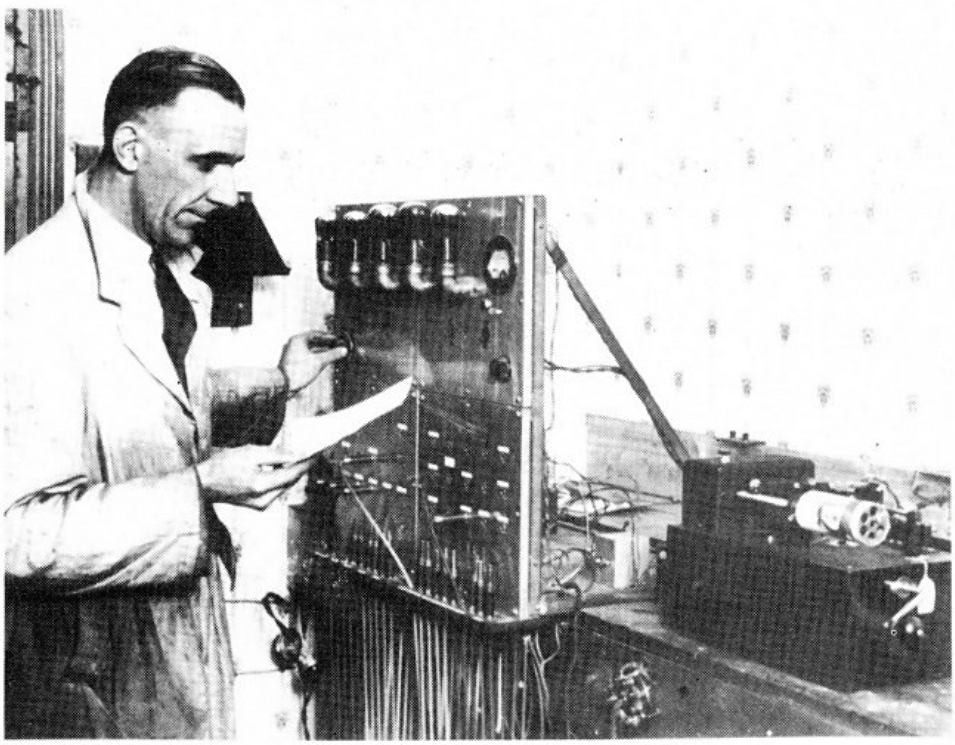
6 Torring Road
East Hawthorn 3123

Pioneer Australian Aviator and Radio Engineer

Born:
ARMADALE, MELBOURNE, 1904
Died:
SYDNEY, JANUARY, 1981



Gil Miles in 1929, at the South Melbourne Television and Radio Laboratories Pty. Ltd., feeding facsimile and TV video signals to 3UZ and 3DB. "Fultograph" machine at right used potassium iodide coated paper to build up the picture and was used in the first Australian TV broadcast on 10th January 1929.

Photo from Science Museum, Vic.

Gil joined the Royal Australian Air Force as an aero engine fitter in 1922. Like many engineers of his generation, he had an early interest in the new technology of radio, having joined the Wireless Institute of Australia in 1919. By 1922 Gil acquired his amateur radio licence, initially going to air under the call sign 3II, later A3II, and later still VK3II. Spark equipment, almost standard at the time, became the basis of his station, but he soon progressed to using the new de Forest valves, and began to experiment in the relatively untouched field of HF communication.

In the early 20s, several Australian "hams" succeeded in using the new high frequency radio equipment to receive signals over unprecedented distances with low power, making commercial radio concerns take notice of this major achievement.

Gil had been receiving the signals of the Macmillan polar expedition on relatively simple valve receiving equipment for some time, when he eventually drew the attention of his military superiors at Point Cook to the possible advantages of HF radio. Having proved the validity of his

proposals with a practical demonstration, he was seconded from the Number One Squadron Aeronautical Section into the Radio Section, to design and build the Australian Air Force's first shortwave radio transmitter in 1924. This was given the call sign of V1S (Victorian Number 1 Squadron), and allocated a wavelength of 32 metres, a very high frequency for that time, with the intention of establishing direct communication with the Air Ministry in London. After this flurry of activity, Gil returned to aero engineering for some time, retaining radio as a constant hobby interest.

Gil's radio experience again became useful in 1925 when the Air Force was given the job of surveying Australia for the coming air routes to be used in the burgeoning field of civil aviation. He accompanied several survey flights from Point Cook to Tasmania by seaplane; and from Point Cook to Fort Forrest near Fremantle in Western Australia. On these flights, apart from providing aero engineering skills, he supervised the operation of airborne radio equipment, receiving from the various coastal radio stations around 600 metres, and transmitting position back to base regularly. On the Tasmanian flight, the two seaplanes which surveyed the route were able to keep in contact with the outside world constantly through the Point Cook station, or the ship stations VIM, Melbourne, and VIL, Flinders Island.

Civil aviation was an up-and-coming industry in 1927, when Gil left the Air Force to join Qantas Airlines in Longreach, Queensland, again as an aero engine fitter. But the real interest which Gil wanted to pursue was radio research, and Gil wasn't happy with the way the airline, at that time, was losing money. He jokingly said in later years that he couldn't see Qantas ever "making it" financially.

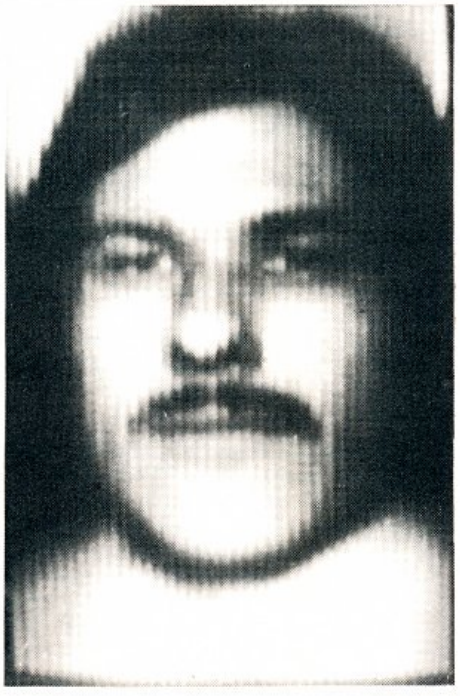
At this time Gil's father knew the radio engineer Donald Macdonald, who was responsible for the supervision of the construction of broadcasting stations 3AR, 5CL and 7ZL. Macdonald was a man of remarkable enterprise and inventiveness, whose professional radio experience extended back almost to the dawn of radio communications.

In September 1927, Macdonald formed his own company, *Television and Radio Laboratories Pty. Ltd.*, in Melbourne. Putting the embryonic invention of "visual wireless" before the Australian public, he was concerned to find an engineer with the necessary mechanical and electronic talents who could construct a working television system along the lines of the contemporary experiments of C. F. Jenkins in America, and John Logie Baird in England. Macdonald had met the American television pioneer, Jenkins, while on an American tour in 1926, and returned to Australia with plans, circuit diagrams, and key components such as photocells and neon lamps, which helped the little concern to be the first in the television field in Australia.

In Gil Miles, Macdonald found the perfect combination of mechanical and electrical experience for the job. Joining the company in April 1928, Gil immediately got stuck into constructing a mechanical-optical motion picture film scanner employing nipkow scanning discs, and built several mechanical television receivers for demonstration purposes. Following the lead of the world's first regular public television station run by GE in America — WGY of Schenectady, NY, which transmitted its first TV programme on May 10, 1928 — the Australian experimenters used the same standard of 24 lines per picture, 15 pictures per second.

By the end of 1928 Gil was able to transmit simple cartoon films, grey scales and geometric designs with the system, and on January 10, 1929, using the same system, he transmitted Australia's first test of broadcast television through station 3UZ, Melbourne, outside regular broadcasting hours. The video signal, comprising a bandwidth of no more than a few kilohertz for these simple transmissions, was carried from the TRL laboratory in Albert Road, South Melbourne, to 3UZ in Bourke Street by equalised PMG telephone lines, and transmitted by 3UZ on their usual broadcast-band wavelength.

Television's use, at this time, for anything more than an experimental service was fairly questionable. So by June 1929 *Television and Radio Laboratories* began to phase out their television transmissions in favour of a facsimile picture service of a more utilitarian nature. Experimental transmissions of still pictures using a process similar to the "Fultographic" service provided by the BBC in the late 20s were made by the company from 1929 to 1931, through stations 3UZ, 3DB and 2UE at the end of the stations' evening programmes. In the design and operation of this facsimile equipment, Gil played a major part. The intention was to institute a public broadcast service of facsimile of news photographs, written and typescript messages for public dissemination, and for dissemination to country newspapers. An earlier attempt to tender for the supply of facsimile gear used by the PMG in their Sydney-Melbourne phone service had been unsuccessful. Siemens and Halske won this tender for the PMG service which commenced in September 1929.



Tony Sanderson VK3AM on narrow band TV system. This was one of Gil Miles' last projects, in association with the author.

Permission to commence the *public* facsimile service was given in July 1930 by the PMG so that Television and Radio Laboratories could be re-floated as a public company under the name of *Radiovision (Australasia) Ltd.* on September 2, 1930. And so the first public service of broadcast pictures in Australia commenced from 3DB, Melbourne, on September 15th, 1930, with 3UZ commencing public broadcasts of facsimile pictures on the following day. The technical arrangements were under the control of Gil Miles, Macdonald, and Ross Pitkethly of the Radiovision company.

It seemed that the company was finally on a firm financial basis for further business, so that a move was made to larger factory premises at 378 St. Kilda Road for the manufacture of still picture receiving apparatus, with Miles and Macdonald in charge. But they hadn't calculated on the commencement of this century's worst financial depression, and a consequent lack of public response to the transmissions in spite of technical excellence.

Towards the end of 1921, Radiovision Ltd. was forced into the manufacture of radio receivers as a survival measure and, discouraged by the nature of this routine and repetitive work, Gil sought greener fields for his creativity.

Through the 1930s Gil built the original transmitters of several broadcast stations, including that of 3AW, Melbourne, built under contract by Gil while he was working for O. J. Nilsen's, operators of 3UZ, in 1932. In the mid-1930s he built the original transmitter of Hobart station 7HT in Melbourne, and after supervising the installation of the transmitter he was appointed the chief engineer of 7HT until 1940. Prior to leaving Melbourne, Gil had done some of the first local phone transmissions on the five metre band, in association with Ivor Morgan VK3DH, H. K. Love VK3HK, George Thompson VK3TH, and many others. In fact, it was H. K. Love, a past president of the Vic. Division, who took over from Gil at *Radiovision Ltd.* in 1932 — an operation which eventually lead to the establishment of Kingsley Radio, makers of the famous AR7 receivers.

During the war, Gil moved to Sydney to take charge of the transmitter test room at AWA's Ashfield works, and every transmitter from 500 milliwatts to 2 kilowatts that AWA manufactured for the armed services went through Gil's hands.

On the cessation of hostilities Gil joined CSIRO's Sydney Radio Physics Laboratory, doing the work he'd always wanted to do in fundamental and applied radio research. This was a particularly happy time for him. Working in diverse fields such as upper atmosphere research and radioastronomy, he found an absorbing interest at almost every turn. In the course of these experiments he found a use for his early experience in television, building a tiny mechanical television scanner out of a modified alarm clock mechanism to detect condensing nuclei in airborne cloud chambers, carried aloft into the atmosphere by unmanned weather balloons. This allowed him to do quantitative research into the effects of gamma and cosmic rays in the upper atmosphere.

By 1957, working under the new call sign of VK2KI, he designed circuits and wrote articles on the design of television gear using readily available disposals components. These articles in *"Radio, Television and Hobbies* (now *Electronics Australia)* gave many amateurs their first view of the early Australian television programmes. In times when television tubes were rare, and surplus radar tubes from the war were still common, information on the adaptation of electrostatic CRTs to the television service was eagerly sought after. These circuits, much later, became the basis of several important pieces of equipment used in the development of narrow band television systems constructed by D. B. Pitt and Alan Short in England, and by Dan Van Elkan VK3UI and myself in Australia.

Retiring in 1965, Gil reconstructed his original 1929 film scanner/monitor and early RAAF radio gear as exhibits for the Science Museum, Melbourne. He also continued research into slow scan television, being one of the first Australian radio amateurs to receive that mode of transmission.

Following the publication of an article on Miles' early TV experiments in December 1969's *Electronics Australia*, I was enthused to try some of the simple techniques employed by Miles to achieve TV. I'd been experimenting with modulated light communication systems for several years prior to this, and realised that this equipment could be made to transmit television with the addition of a suitable mechanical scanner. Starting with an 8-line scanner, I proceeded to 16 and 30 lines. At this stage I wrote to Mr. Miles for the first time.

His enthusiasm and encouragement was infectious. "I delayed the answer to your letter," he wrote, as I had intended visiting Melbourne before Christmas 1971 . . ." Thus commenced a decade of correspondence, friendship and occasional collaboration, cut short only by his death. By the time he visited me early in 1972 while I was still 17, a 48-line scanner had been built, and Dan Van Elkan VK3UI and myself had put the first signals in the current resurgence of narrow band television interest to air. Concurrently, Gil was constructing his museum exhibit of 24-line TV for the Melbourne Science Museum.

His encouragement pushed us further ahead, and his practical experience was always invaluable. Development of systems for narrow band (moving picture) television on HF radio shifted from the reconstruction of mechanical systems to the development of newer and more efficient electronic systems for achieving the same ends.

By 1975 correspondence with British narrow band television experimenters had been progressing for about three years, and Gil became interested in our experiments in a practical way. In 1978 and 1979 Gil visited the British group and was elected president of the Narrow Band Television Association, based in Nottingham, UK. He also had the opportunity of meeting many of the British television pioneers, such as Douglas C. Birkinshaw, the BBC's first television engineer and a noted technical author. In the course of these visits he located a taped copy of a video recording made on a 78 r.p.m. gramophone record by John Logie Baird in the 1930s. On his return to Australia he built equipment to display this early 30-line video recording, which must rate as one of the earliest surviving video recordings.

The author, reproduced by narrow band TV system, a joint project with Gil Miles.

From 1976 to 1980 Gil carried on as the only Australian contact for the Narrow Band Television Association. Around 1978-1980 I visited Sydney in the course of research jobs, and always made a point of visiting Gil. His inventiveness and quick mind remained with him right to the end, and he latterly devised many new and novel means of synchronised systems for narrow band television, based on logic circuitry.

On September 20th, 1980, we saw the culmination of our efforts in the first long distance HF transmission of NBTV, using a bandwidth no greater than that of a standard AM transmission (N kHz). Tony Sanderson VK3AML transmitted images of moving subjects from Melbourne on 1840 kHz, while Gil Miles VK2KI, in Sydney, and John Ingham VK5KG and myself, in Adelaide, simultaneously watched readable moving pictures come through over 450 miles for the first time.

These pictures were relayed on fast scan TV over the Adelaide ATV repeater, VK5RTV, via a CRT screen and vidicon camera patch. About 15 ATV enthusiasts in Adelaide witnessed the event via the repeater, and a videotape of the event was made by John 5KG, which is now held by the WIA. The pictures were rather noisy, but titles and movement were clearly legible, although conditions and equipment were far from optimum.

On my last visit to Gil, just before Christmas 1980, his construction work was still progressing and he showed me a tape that he'd recorded from the VK3AML NBTV transmission with great enthusiasm. During that visit I recorded an interview with him, talking over his early career and achievements in electronic and aviation engineering. He showed no sign of ill-health, and his death at the end of January 1981, after a very brief illness, came as a shock to everyone, particularly those of us in Australia who knew him well.

Though some 50 years separated us in age, Gil always was like a "favourite uncle" and his friendship will remain a cherished memory and a valued inspiration to all of us who knew him.

Chris Long would like to hear from anyone with information on the early TV experiments in Australia. ■

VHF-UHF Band Plans

John Martin VK3ZJC
for the VHF-UHF Advisory Committee

The following is a summary of the official WIA Band Plans for the VHF and UHF bands, followed by a proposal for the microwave bands.

TUNABLE SEGMENT

For each band, a segment 1 MHz wide is set aside for tunable operation. For the sake of convenience and consistency, this segment is the same on each band.

The plan for the tunable segment is shown in Figs. 1 and 2. The entire 1 MHz segment is shown in Fig.1, while the first 100 kHz are detailed in Fig. 2. The frequency shown as "fo" is the lower limit of the band in question (i.e. 52.0, 144.0, 432.0 or 576.0 MHz).

In order to ensure the most effective use of these tunable segments, all amateurs are asked to observe them as a "gentlemen's agreement". Interference can be greatly reduced if the following restraints are observed:

1. EME and beacon segments should be left clear of all other operation.
2. The DX segment should be left clear of any local operation.
3. Calling frequencies should be used only for calling and establishing contact, and cleared once contact has been made.
4. Net operation, or the use of wide band modes (i.e. modes other than those listed in Note 2) should be done outside the tunable segment.

BAND-BY-BAND SUMMARY

6 METRES

52.0–53.0 Tunable segment (Fig. 1). NOTE: Because of FM nets immediately above 52.5 MHz, the secondary beacon segment is 52.3-52.4, rather than 52.5-52.6 MHz.

53.0–54.0 FM repeaters and simplex nets.

2 METRES

144.0–145.0 Tunable segment (Fig. 1).

145.0–145.7 General operation, DX, local and experimental; all modes.

1457.–146.0 Satellite allocation.

146.0–148.0 FM repeater and simplex nets.

70 CENTIMETRES

420–432 ATV primary channel, DSB or VSB. Video 426.25 MHz, sound 431.75 MHz.

432–433 Tunable segment (Fig. 1).

433–435 FM repeater outputs.

435–438 Satellite allocation .

438–440 FM repeater inputs and simplex nets.

440–443 General and experimental operation.

443–450 ATV secondary channel (VSB). Video 444.25 MHz, sound 449.75 MHz.

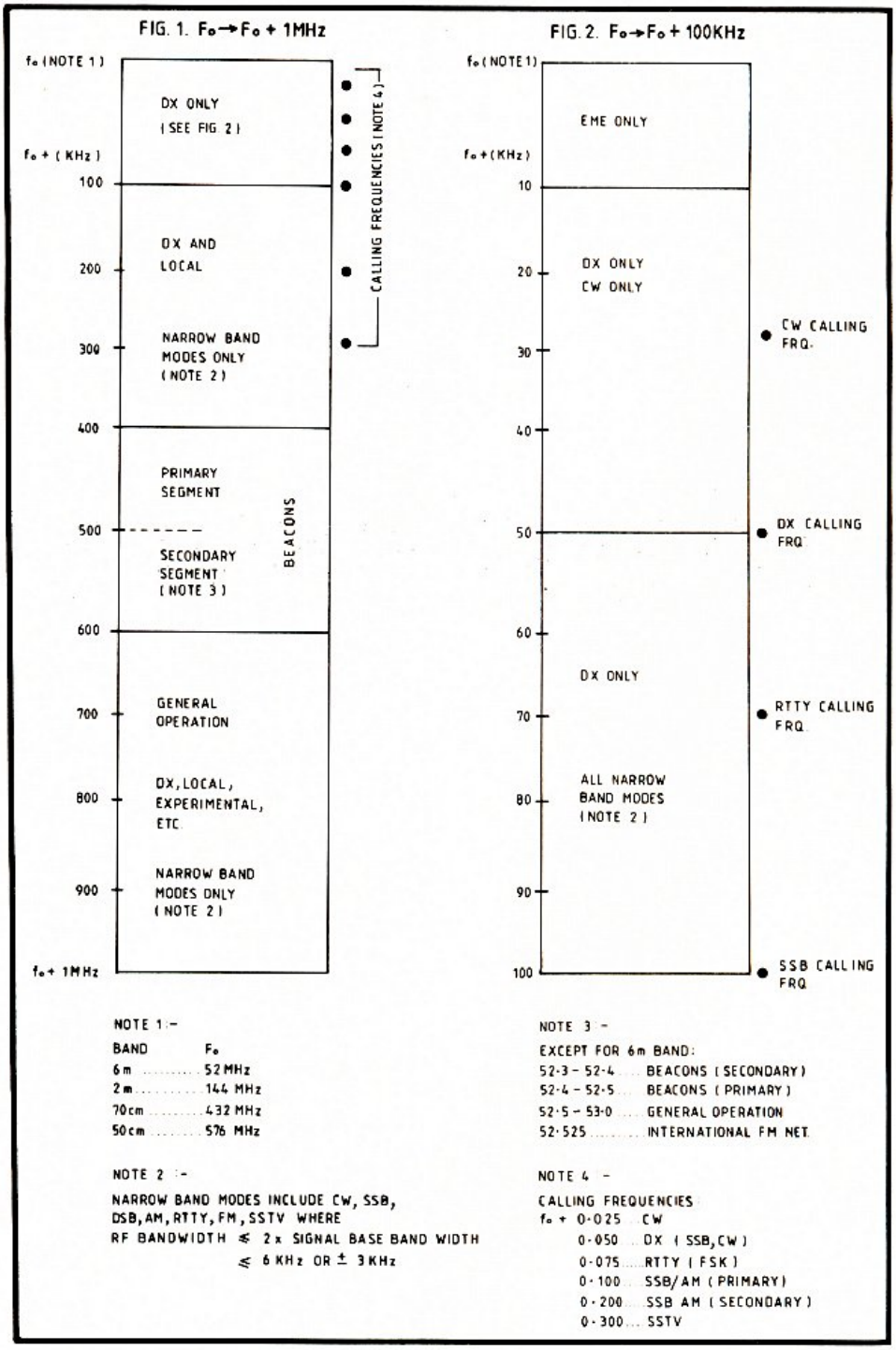


FIG. 3: Suggested tunable segments for microwave bands.

Band	Freq. Limits	Fo (MHz)	Fo = 144 MHz X
23 cm	1215- 1300 MHz	1296	9
13 cm	2300- 2450 MHz.	2304	16
9 cm	3300- 3500 MHz	3456	24
6 cm	5659- 5850 MHz	5760	40
3 cm	10,000-15,000 MHz	10368	72

50 CENTIMETRES

576–577 Tunable segment (Fig. 1).
577–578 General, experimental and net operation.
578–585 ATV channel (VSB) and ATV repeater output. Video 579.25 MHz, sound 584.75 MHz.

BAND PLANNING FOR 23 CM AND HIGHER BANDS.

The VHF-UHF Advisory Committee has been investigating band planning for 23 cm and higher bands. Information from overseas sources is rather hard to come by, and the Committee feels that we should not commit ourselves to full band plans until we have more information about developments in ather countries.

The VHFAC does, however, recommend the adoption of a 1 MHz wide tunable segment in each of the microwave bands, following the plan already current for 6 metres, 2 metres, 70 cm and 50 cm. The tunable segment in each band would begin at a frequency ("fo" in Figs. 1 and 2) which was a multiple of 144.0 MHz. This is consistent with existing Australian and international practice, due to the widespread use of varactor multipliers driven by 144 MHz transmitters. The suggested frequency "fo" for each band, and its harmonic relationship to 144 MHz, can be seen in Fig. 3. Comments on these proposals from any interested amateurs would be most appreciated, as would comments on any other aspects of band planning. ■

BOOK REVIEW

Reviewed by VK3UV

THE ARRL AMATEUR'S 1981 HANDBOOK

Like most radio amateurs, the need for a good up-to-date technical reference book is a must.

The 58th edition of the ARRL Handbook certainly fulfills this requirement. Included in the additional 64 pages are many state-of-the-art circuit designs (including PCB artwork), antenna design criteria and fundamental tutorial law.—VK3YTP/NMJ.

Available from MAGPUBS, $12.00 (plus P&P — 1 kg); P.O. Box 150, Toorak, Vic. 3142. ■

TITLE: Early Radio Wave Detectors.

AUTHOR: V. J. Phillips, University of Wales.

PRICE: £E19.00. Available from Peter Peregrinus Ltd., Marketing Department, Station House, Nightingale Road, Hitchin, Hertfordshire, England SG5 1RJ.

The book is a survey of early detectors. It provides an insight into the difficulties experienced by the early experimenters, who, until quite a late stage, had no effective way of amplifying an incoming RF signal, and it evokes admiration for their ingenuity and inventiveness.

The book covers a period extending from Hertz's experiments up to the coming of the crystal detector and valve, which events may be considered as taking radio into the modern era.

Many hundreds of references to other sources of information are made, and would be most useful for those readers desiring to explore any particular item described in greater depth.

It is interesting to read how our forefathers evolved the electronics explosion. All experiments are graphically explained with reproductions of the original schematics and patents. Although this reviewer may consider the cost of the book a little expensive for general information purposes, it certainly provides the knowledge and history unobtainable in other single volumes.

Fascinating reading for the not too technical reader.—VK3UV. ■

TITLE: A Guide to Amateur Radio — 18th Edition.

PUBLISHER: RSGB.

AUTHOR: Pat Hawker G3VA.

PRICE: $A5.90, plus p. and p. (260 g). Available from WIA Magpubs, PO Box 150, Toorak, Vic. 3142, or direct to RSGB — £E2.99 (plus p. and p.).

An updated version of the previous editions, written with the usual excellence of Pat Hawker's (Radio Communication's "Technical Topics" editor) capabilities, containing clear schematics and explanations, with several printed circuit board layouts for various projects.

The book is intended to assist the newcomer to learn more about the hobby, but I feel is basically a little "too technical" in the opening chapters and remarks for a raw beginner.

The author possibly assumes the newcomer has a reasonable grasp of high school physics at least, as without some sort of prior basic knowledge of some of the technical terms introduced early, the non-technical newcomer could quickly become disinterested.

Therefore, the book is recommended as a textbook for classroom use where a tutor is on hand to explain subtle and unfamiliar terms or, alternatively, as a reference for simpler explanation of some of the areas covered in the RSGB Amateur Radio manuals themselves.

Designed basically for the British amateur, it contains the usual chapters on getting started, operating an amateur station, communications receivers, transmitters, antennas, etc.

The book also contains technical information and operating data of interest to all radio amateurs, including a useful chapter on factory built receivers, transmitters and transceivers.

Would be a very useful and handy reference for Australian novice licence applicants, who have commenced or are about to commence study under some form of local tuition, also for the newly licensed amateur (novice or full) who desires to learn with simpler explanations of material covered in the more technical publications and handbooks. ■

WIA INSERTS INTO AR

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All inserts must comply with Postal Regulations and must be received not later than the 26th of the month preceding publication date.

Nuclear Power

Colin Yates VK2AGZ
16 Gari Street, Charlestown 2290

Uranium! Now an emotional word and on everyone's lips but when I was a student in secondary school in the early nineteen-thirties, uranium was just one of the 92 known elements. In Chemistry we were told of its chemical compounds and its industrial uses and then, almost as an after-thought, it was mentioned casually that the element was weakly radioactive. It still IS only weakly radioactive.

There were usually a few lumps of uranium ore lying around in a cupboard in the chem. lab. and we had this interesting property of radioactivity demonstrated to us by the discharge of a gold-leaf electroscope. We were not to know then that the time would come when a few lumps of uranium ore would be regarded with fear and suspicion by the lay public. At that time the element that was "in the news" was radium, which we were told was one million times more radioactive than uranium. It still is — but who worries about radium today?

I recall also very well the announcement in 1932 of the discovery of the neutron, as that particle is now known. This news item merited about two inches of column space in the daily press. Up till that time the construction of matter had been explained entirely in terms of protons and electrons.

Towards the end of the nineteen-thirties we were startled to learn that the nucleus of one particular isotope of uranium (U235) could be caused by neutron absorption to split into two nuclei each approximately half the atomic weight of parent nucleus. Here at last was the dream of the alchemist realised — the transmutation of an element into other elements. The significance of this discovery is that when fission of the nucleus occurs more than one neutron is released (either two or three in point of fact) so that the possibility of a chain reaction exists. U235 is the only element occuring in nature that does this. Unfortunately naturally-occurring uranium contains less than one per cent of U235, the balance being U238, which is ordinarily non-fissionable. The physics of this transformation has been described so many times that I need not re-hash it here except to say that the total energy of the fission products is less than the energy of the original particle, the difference appearing as heat and is considerable. Others may prefer to explain the appearance of free energy in terms of Einstein's equation relating to the equivalence of mass and energy.

I cannot refrain from mentioning here that in 1940 as a young engineer I attended a gathering which was addressed by an eminent engineer who was at the time I think the President of the Institution of Engineers, Australia. His subject was the energy crisis (yes, they had an energy crisis in those days, too!) and in the course of his address he referred to "scientists who pursue that Will-o'-the-Wisp, the energy locked up in the atom". Will-o'-the-Wisp indeed! That eminent engineer did not know what was just around the corner.

Come 1945 and the world at large was astonished to learn of the immense research effort that had been going on under the cloak of wartime secrecy. We learned with awe of the production of completely new elements, one of which, Plutonium (No. 94), looks like changing the course of world history. Even the alchemists were not so ambitious as to attempt the manufacture of completely new elements.

I must say that I heard with the utmost astonishment the news that uranium, a weakly radioactive element, could be the source of the immense energy now revealed to us.

POWER STATIONS

Those of us concerned with the production of energy for industrial purposes were immediately interested in the possibility of utilising this new source of energy. But it was quickly obvious that there was a serious snag, namely, the second law of thermodynamics. This sounds forbidding, but it means in practice that for the efficient conversion of heat energy into mechanical energy (thence to electrical energy) the source of heat must be at a fairly high temperature — I am thinking of at least 500°C. The nuclear reactors in use at that time were primarily for the production of plutonium intended for war-like purposes and the cooling fluid (water) emerged at a temperature far too low for efficient energy conversion.

Those readers who have visited a large modern steam power station and who have observed the immense boilers in use, boilers which evaporate **tonnes** of water per hour and produce steam at a temperature of about 500°C, will immediately recognise the tremendous difficulties of utilising nuclear fuel for steam-raising purposes: Vast quantities of heat are required; the heat must be at a high temperature; the effect of radiation on the structural materials used was at that time quite unknown (and radiation of the most intense kind, too); the whole reactor had to be enclosed behind a heavy protective shield to safeguard humans against the disastrous effects of radiation; the control of the equipment had to be by remote means; any failure of equipment could lead to immense disaster. It was a daunting prospect.

It is a great tribute to the nuclear engineers concerned with the development work, ably supported by the physicists and the metallurgists, that these difficulties have been overcome and large nuclear power stations have been successfully brought into operation.

The Central Electricity Generating Board (CEGB) in the United Kingdom now has nine large nuclear power stations in operation making a substantial contribution to electricity supplies.

A typical nuclear power station has two reactors each containing about 26,000 elements. Typically each fuel element is about 1m long and about 5 cm in diameter, and weighs about 12 kilograms. The material is natural uranium and is contained in a sheath which could be a magnesium alloy. Fuel elements remain within the reactor until the energy within the fuel is spent which could be from 3 to 7 years. During operation a small amount of U238 is converted to plutonium. The plutonium is dispersed throughout the uranium and must subsequently be separated out by a complex chemical process.

Spent fuel rods are stored at the power stations for at least one year by which time the short-lived radioactive elements will have lost most of their activity. They are then sent by rail to Windscale in Cumbria for reprocessing.

WASTE

The disposal of waste has been a matter much in the public eye. What is this waste? The capture of a neutron by the nucleus of a U235 atom causes that nucleus to shatter and the nuclei of a considerable number of other elements are formed. It is as though you hit a large stone with a sledge causing it to shatter into smaller stones together with a considerable quantity of pebbles of various sizes. Additionally, other radioactive elements are formed by irradiation of the structural material of the reactor.

A total of something like 300 different elements so formed have been found in the fission products. Of these about 180 are radioactive. However, many of the radioactive elements thus formed have very short half-lives and rapidly lose their radioactivity.

Some of these fission products are gaseous and if in sufficient quantity must be trapped and bottled. We note for instance xenon-133 with a half-life of 5 days and krypton-85 with a half-life of about 10 years. These gases are of the inert gas group and therefore do not enter into the chemistry of the human body. The only danger to humans is from radiation from the gas (not to be underestimated, however). It was the escape of xenon-133 into the atmosphere which caused concern at the Three Mile Island affair. Subsequently during re-commissioning operations radioactive krypton was released. This latter element is normally absorbed into the uranium during formation and is driven out only by high temperature.

Examining the list of fission products we note two isotopes of iodine. They are I131 with a half-life of only 8 days and I129 with a half-life of 17 million years. Iodine is an element readily absorbed into the human body. The I131 is clearly not much to worry about (the life being so short). So far as the I-129 is concerned, I am informed that the yield is low, and as in the case of all long-lived radioactive elements the activity is low. However, if this element gets into the water-cycle of the earth we will have it with us for evermore. With the proliferation of nuclear power stations the I-129 will have to be separated out from the waste and either transmuted to another element or stored.

The elements in the waste which cause the most concern are the ones with an intermediate half-life (say about thirty years) and which are abundantly produced. Amongst these we note: Cerium-44, with a half-life of 284 days, contributes the most activity in waste about one year old. Strontium-90 and Caesium-137 both abundantly produced and with half-lives of about 30 years; this material will have to be stored for the time being. Then there is Ruthenium-106 with a half-life of one year; ruthenium is a metal in the platinum group of metals; it is difficult to separate out by chemical means.

Waste? The more I probe the subject the more impressed I am with the difficulties. In this brief article I have barely glanced at the subject. It is fair to point out, however, that it has been stated on good authority that if all the power required in the UK were produced in nuclear power stations the total amount of fission waste would only be about 35 tonnes per annum; it may be nasty stuff but there is not very much of it.

FAST BREEDER REACTORS

I sometimes hear it said that we don't need to worry about supplies of uranium since "we can breed it now". This is not true. It is **plutonium** that is bred, not uranium. The so-called fast reactor does two things simultaneously: it produces energy by fission of plutonium and at the same time converts U238 into plutonium. It is possible to produce more plutonium than is consumed, so it is termed a "breeder reactor" but the "raw material", so to speak, is U238. You have the interesting situation that an energy-producing device manufactures more fuel than it consumes!

I should interpose here that it is possible to manufacture uranium from thorium (No. 90 on the list of elements) in a reactor but the yield is less than unity so it could not properly be described as a "breeder reactor". The uranium thus manufactured is the isotope U233, which does not occur in nature, but is fissionable.

Why is the term "**fast** breeder reactor" used? The word "fast" refers to the velocity of the neutrons. Reactors fuelled with U235 have to have the neutrons produced by fission slowed before they will cause fission in further atoms. This is performed by a so-called moderator, usually graphite. When plutonium is the fuel it is not necessary to slow the neutrons with a moderator, and the reactor is referred to as a fast reactor because it employs fast neutrons.

Incidentally plutonium is one of the most dangerous substances produced by man. It is undisputed that 1 milligram will kill a human. When you remember that there are **tonnes** of the stuff in a fast reactor the dangers are apparent.

An engineer high up in the United Kingdom Atomic Energy Authority (UKAEA) told me recently that there was really no alternative but to go ahead and develop fast breeder reactors for commercial use in the production of power, if for no other purpose but to "burn up" the plutonium (which he referred to as "this nasty stuff") which was accumulating from the operation of uranium-fuelled reactors.

Much of the research and development work carried on in the UK in this field has been performed at a research establishment at a place called Dounreay on the far north coast of Scotland. The time will come when Dounreay will go down in the history books as the place where the detailed work was carried out which eventually enabled Great Britain to survive the energy crisis. It is the workers there — the university-trained engineers, physicists, metallurgists and others, ably supported by that indispensable hand-maiden of the physical-sciencies, mathematics — who have demonstrated yet once again that these days it is the patient detailed work by well-trained and well-eductated people that matters in the field of scientific research.

THE FUTURE?

The role of a prophet is a thankless one. Nevertheless I will predict that during the 1980s fast breeder reactors will come into commercial use for the production of power; that during the 1990s glassified-waste will become general; and that during the 21st century fusion-reactors will take over from fission-reactors. ■

JOIN A NEW MEMBER — NOW!

The Evolution of a 10 metre Multi-Element Beam

Leo Weller VK3YX
44 Pepperell Ave., Glen Waverley 3150

Many amateurs who construct their own beam antennas are content to reproduce in every detail a published design and accept the resulting performance without question. VK3YX has instead carried through a programme of investigation from dipole to 5-element beam, adding one element at a time. He found the results most informative and now shares them with us all.

To approach a job like this, some basic tools and skills are needed plus an SWR meter, a grid dip oscillator, a dummy load, an impedance bridge and a support for the aerial. The top of the mast must be above houses, trees and other aerials. Easy access to the top of the mast is essential. For maximum experimental benefit it should be possible, without much physical effort, to lower the beam within ten minutes.

The first test was to check the 50 ohm coaxial cable. With one end terminated in the 50 ohm dummy load and the other end in a one turn link, the grid dipper, as hoped, gave no sharp dips between 27-31 MHz. After replacing the one turn link with a plug and connecting the cable to the SWR meter, the reading was unity, both before and after installing on the mast.

Construction began. The radiator of ½ inch aluminium tubing, was 8 feet long on each side. The opening in the centre was 25 mm, fixing hardware mainly cadmium-plated, insulators were plastic curtain rod fixtures and the board was 20 mm by 70 mm by 1.2m softwood. See Fig. 1.

RESONANCE

It is essential for understanding the experimental results to have a clear appreciation of resonance. To quote from William I. Orr W6SAI, in his wire antenna handbook:

"For any antenna there is one frequency, called the resonant frequency, at which various characteristics of the antenna are in a state of electrical balance, and at which frequency the antenna is in a condition of maximum efficiency. The resonant frequency is a function of the electrical length of the antenna, which may or may not bear a relationship to the physical length in feet and inches. Any antenna may be tuned to resonance by auxiliary gadgets, but such devices may be a nuisance and of questionable efficiency. A resonant antenna requires no such devices and is a simple and effective radiator and receiver of radio energy."

The dipole was mounted in the operating position with cable connected, as in Photo 1. Resonance was checked with the GDO and found to be outside the low end of the band. By cutting off short lengths from each end of the element the desired frequency was reached. An SWR check agreed roughly with the GDO and was accepted. Unity SWR could not be achieved as the dipole impedance is greater than 50 ohms.

Many contacts (some DX) were worked on this dipole, including W6, D, XE, ZL, I, in the four weeks before venturing to the next step.

REFLECTOR

The second element, to be used as a reflector, was made 5 per cent longer than the measured length of the dipole. It was fitted in the same way as the radiator to a timber board with four curtain fixtures.

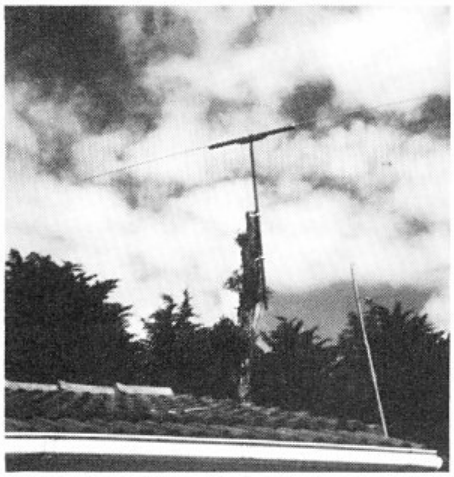

PHOTO 1: Start of the experiment, later became reference dipole.

A boom was assembled as in Fig. 2, using coach bolts and wood screws. Element lengths were re-checked after assembly. Photo 2 shows the antenna.

Under test, the SWR was found to be unity and the resonance sharper and slightly lower in frequency. This is a natural phenomenon, it just has to do this.

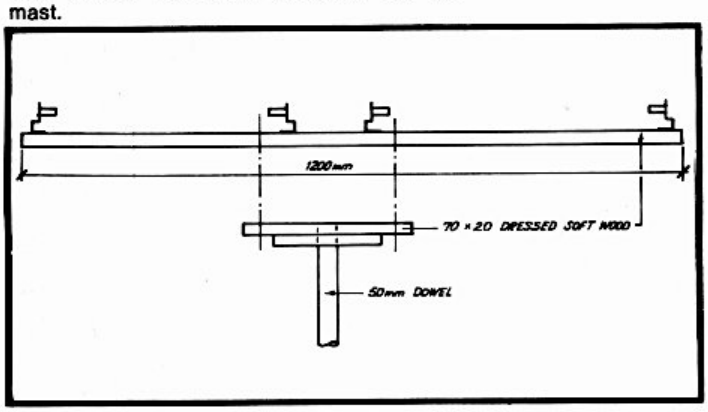

FIGURE 1

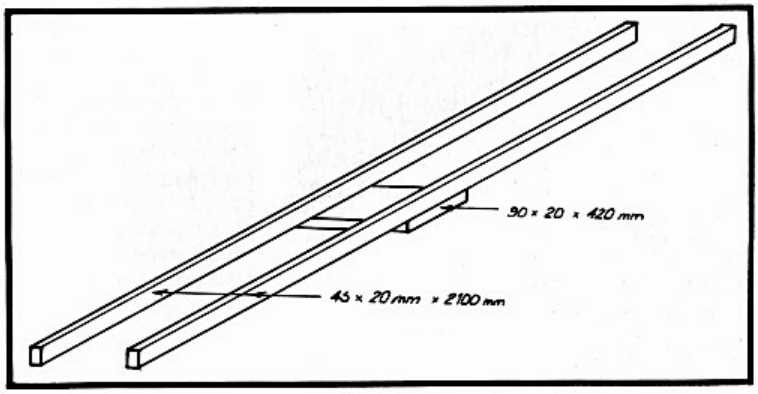

FIGURE 2

This beam was used successfully for some time before further development and enabled contacts to be made with KA, OH, BK, G, OZ, RA.

BALUN

The centre fed radiator is a balanced circuit, but coaxial cable is an unbalanced line. To achieve efficient operation a balanced to unbalanced balun is needed. There are many commercial baluns on the

PHOTO 2: Two element prototype.

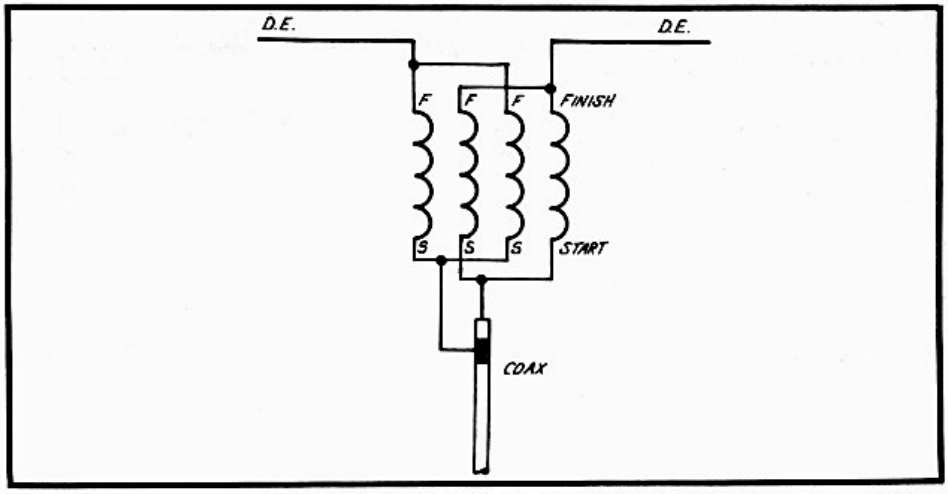

FIGURE 3

market, but most are wide band and maximum efficiency might not be at 30 MHz.

A balun kit was purchased from "Uncle Dick". Wound as specified in the leaflet, the balun seemed appropriate for lower frequencies, but on 10m introduced inductance in the centre of the radiator, lowering the resonance frequency, thereby needing reduction of radiator length. The final balun had only seven multifilar turns of four wires connected in two parallel pairs, as in Fig. 3. It could be inserted between cable and radiator without altering SWR or necessitating re-tuning. Moreover, feeding a dummy load SWR remained 1.0 and a VTVM showed equal voltage between the cable braid and each of the outputs. The balun was used successfully in different configurations on ten and fifteen metres. Other windings were tried but this was found most effective. An alternative was six turns of coax on a ferrite core ring; bulky and heavy, but it performed well.

IMPEDANCE MATCHING

So far in the experiment there was only one unknown, the resonance frequency. The impedance of the antenna being close to 50 ohms needed no special matching.

To achieve maximum efficiency the matching between cable and antenna has to be perfect. Energy transfer is maximum when cable and antenna impedances are equal. SWR is then 1.0.

The continuous battle for unity SWR is to achieve this accurate matching. Finally, some wise words from one of my lecturers from the late 1940s. He was an older man with a grey beard and a voice like Winston Churchill.

"My dear gentlemen, whatever is wrong on one end of the cable cannot, and I repeat cannot be fixed at the other end of the cable."

DIRECTOR

The next logical step was three elements on a 0.2 wavelength boom, making the distance between elements 0.1 wavelength. See Photo 3. More gain, but less bandwidth, was expected. This beam was rather small, weighing only 3 kg, and was used to experiment with different matching configurations, gaining some experience with low impedance antennas. The new (director) element was made 5 per cent shorter than the driven element. Resonance was expected exactly at the design frequency, the effect of the 5 per cent longer reflector and the 5 per cent shorter director cancelling out; however unity SWR was found at a slightly lower frequency. The antenna was re-tuned to the design frequency by cutting 10 mm at a time off the tips of the driven element. Later, the driven element was made adjustable, using ⅝ inch and ½ inch telescoping tubing secured together with a hose clip over a lengthwise saw-cut in the ⅝ tubing.

The three-element close-spaced beam has less than 50 ohm impedance so needs a matching device. The Beta Match with balun proved most successful, easy to make and adjust. Some authors refer to it as Inducto Match. The Hy-Gain Catalogue refers to it in more detail:

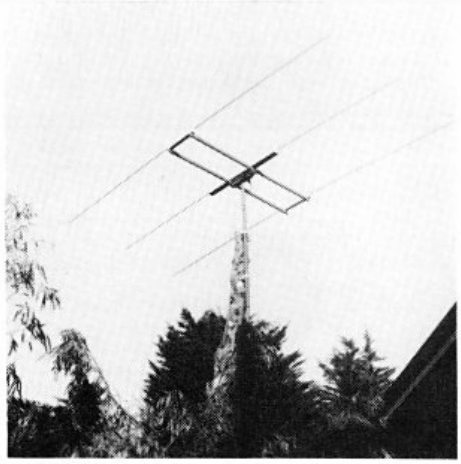

PHOTO 3: Three element beam. Note shorter support for reflector and director.

"The exclusive Beta Match provides the precise amount of inductive reactance to the characteristics capacitive reactance of a half-wave centre fed element to achieve the resisitive impedance required to insure an optimum transfer of electrical energy with minimum SWR. The Beta Match and balun eliminates pattern distortion and spurious side and back lobes to ensure an extremely clean pattern."

Later the Beta Match was found to be TVI free. Very good contacts were made with SM, OE, VU, plenty of UL, UA, UI and even more Js.

WIDE SPACING

All textbooks quote far better figures for gain, back-to-front ratio and bandwidth for wider spacing between elements. Except for matching between cable and radiator no change was required but a longer boom. So a boom support and extension as in Fig. 4 was fitted with coach bolts. For more pessimistic constructors, let me assure you that this construction (with up to five elements) survived all storms in 1978-1979.

The first attempt to match this beam in the same way as the closed-spaced one failed. Unity SWR could not be achieved, and after ten attempts the last line in the notebook reads "impossible". A 1 : 4 impedance ratio balun was wound, tapped to the radiator in delta match fashion some 50 cm from centre and the centre shorted across. This produced unity SWR spot on design frequency.

And what a beam it was! Like having an extra pre-amp in the receiver and a linear on the transmitter. More bandwidth, better reports and all the things an amateur could wish for. Unfortunately, some slight TVI was reported by the family. Contacts were made with DA, DF, OZ, SM and Gs.

MORE MATCHING

At this stage of the experiment, with the three element beam working well, reasons were sought for the failure of the beta match. Cable length was investigated in the hope that the original GDO test, showing correct cable operation, might have been insufficient.

The length of the cable was made an exact number of half wave lengths. Theoretically, then, the impedance bridge

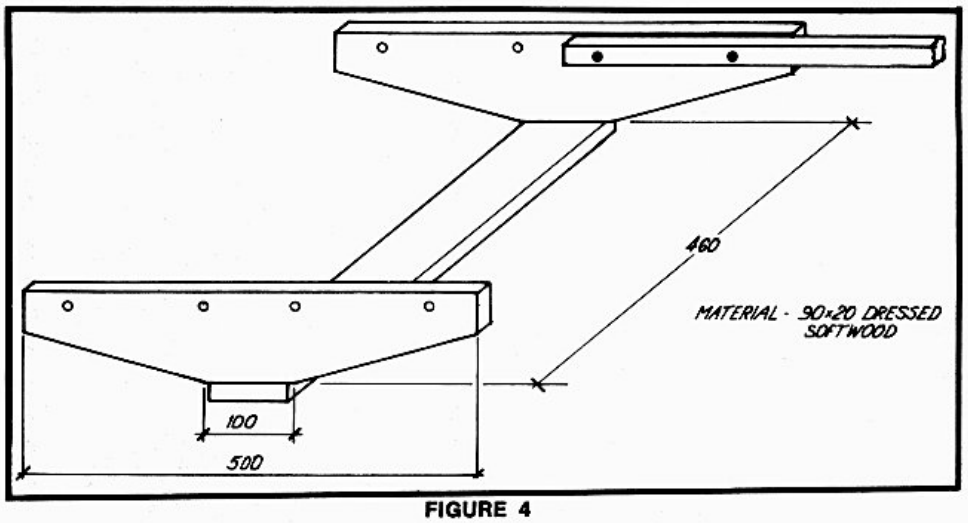

FIGURE 4

would indicate the actual impedance of the antenna regardless of the characteristic impedance of the cable. The length was calculated assuming a velocity factor of 0.66 and necessitated reduction by approximately 50 cm. Unfortunately, no check was made whether this would make the beta match function. More tests showed the cable still to be too long. Tests were made with GDO, impedance bridge and also with a signal generator and a VTVM. While readings were not exactly identical, all measurements showed too low a resonance frequency. Eventually a further 20 cm was removed before the cable resonance was correct.

At this time, test cables were also made, one one-half wave length and one one-quarter wave length complete with plugs. The physical lengths of antenna cable and test cables were found to be integral multiples. Resonance testing with the impedance bridge on a sub-harmonic was most successful, the quarter-wave cable being tested as a half-wave at twice the frequency.

A new attempt was made to produce a beta match for the three element wide-spaced configuration.

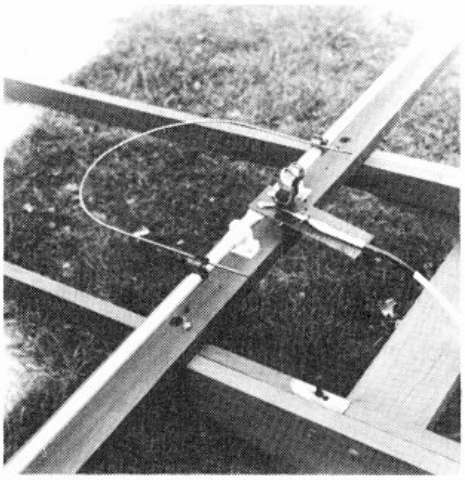

PHOTO 4: Driven element, beta match with balun (cover removed).

radiator was shortened by 5 cm to bring the resonance back to the design frequency readjusting the beta match to keep the SWR unity. No difference was found in performance, but the antenna did not receive on frequencies outside the band. This gave less QRM and quieter reception in the band.

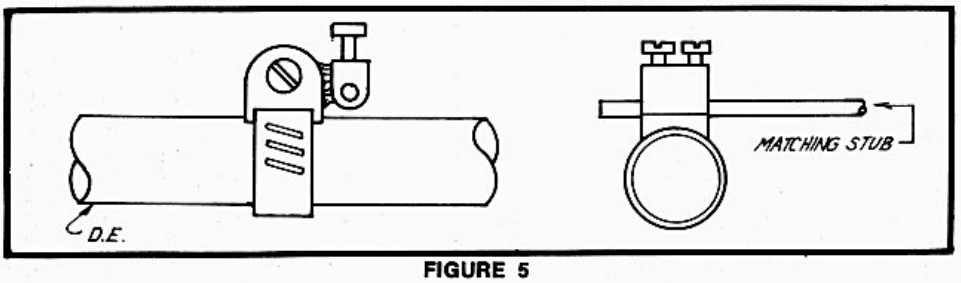

FIGURE 5

Inserts from connector strips were silver soldered to hose clips (Fig. 5), which made possible the shifting of the tapping on the radiator as well as changing the length of the matching stub. The 1 : 1 balun connected in the centre and a full length of bronze welding rod tapped on 10 cm from centre produced 1 : 1 SWR (Photo 4). However due to the inductance in the centre the resonance frequency was too low. The

Having solved the problem, it seemed incredible that a mismatched antenna and 70 cm of coax could make a mockery of impedance bridge, GDO and the SWR meter.

(This seems to have been a classic case of RF outside the coax as well as inside, thus causing misleading and incorrect measurements.—Tech. Ed.)

FOUR ELEMENTS

Very soon the question came up, could one more director be added to the antenna without changing the boom length, achieving more gain and not sacrificing too much bandwidth? Another director was produced. The previous support was thought to be over-designed and the new one was only 45 cm long of 20 x 10 mm timber, using two rod fixtures and in the centre an aluminium bracket made up from flattened tubing. See Photo 5. The new director, of the same length as the first, was fixed halfway between the first

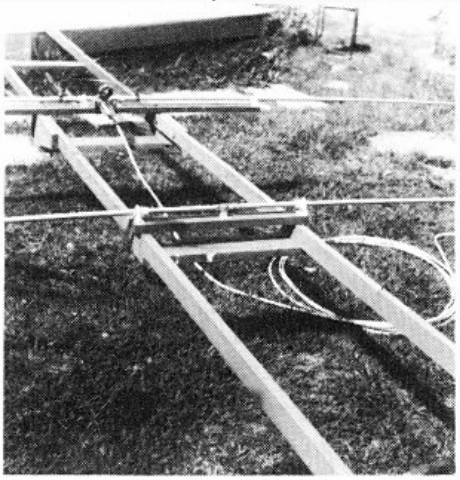

PHOTO 5: Reflector, lighter construction.

director and the driven element. Matching created no problem. The driven element was moved towards the reflector until maximum gain was achieved, at spacings of 0.1-0.12-0.18 wavelength. This was the most successful yagi produced, SWR 1.2 at 28.457 and 28.7 MHz. See Photo 6. New countries were PA, ON, HB, EA, EI, HS, A9 YB.

MORE?

Five elements on equal spacing (0.1 wavelength) were also investigated but because of lower gain and too small bandwidth this experiment was abandoned. See Photo 7. While working on this antenna we stumbled on a very elegant way of widening the bandwidth of a Yagi. Adjust the length of

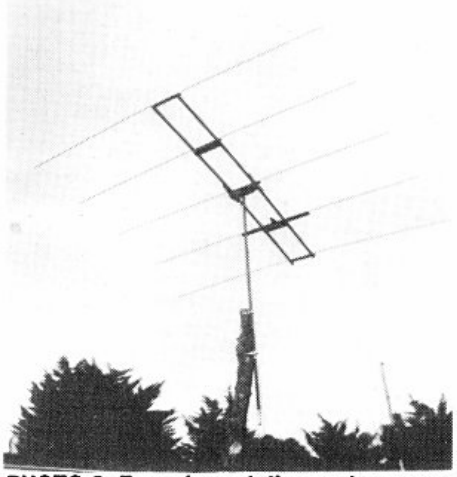

PHOTO 6: Four element, the most successful yagi produced.

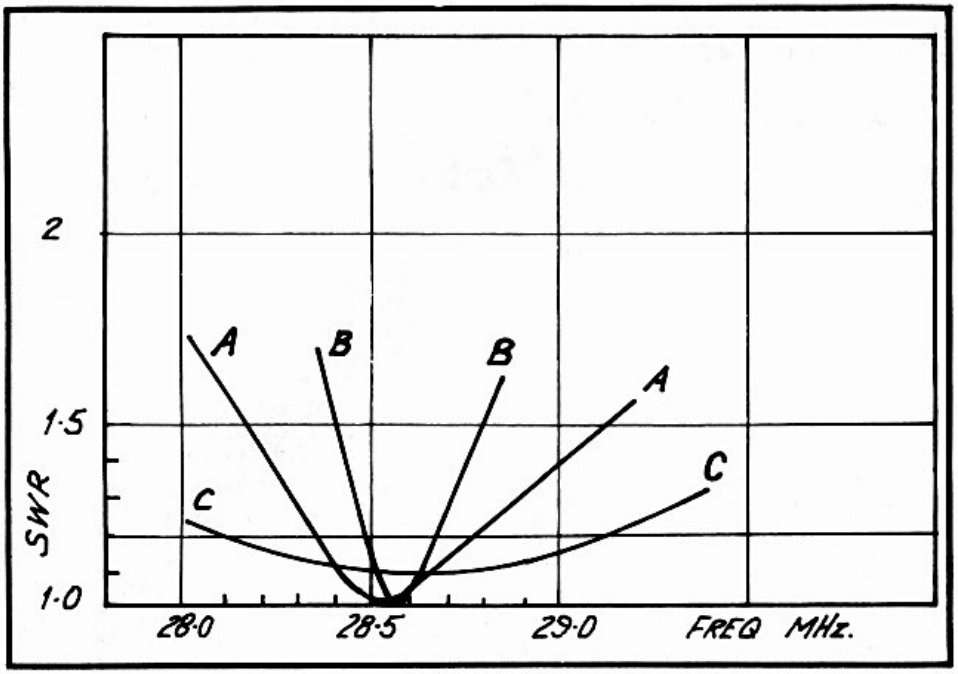

FIGURE 6

the driven element and the matching system to achieve unity SWR on a frequency 0.5 per cent higher than the design frequency. Without changing the match extend the driven element 1 per cent. SWR will be lower over a much wider portion of the band. This is a form of "stagger tuning". Needless to say, efficiency was down, particularly on the two ends of the band.

After bringing the antenna back to four elements and readjusting the beta match, some more investigating was carried out on cable length. Having on hand extension cables ¼ wave and ½ wave long enabled some very interesting observations to be made. Extending the antenna cable ½ wavelength produced no difference in performance. Extending the antenna cable ¼ wavelength impaired the performance. Unity SWR could not be achieved and the bandwidth was reduced. Most remarkable was the beacon segment; the signals around 28.2 MHz completely disappeared with the ¼ wave and ¾ wave (¼ + ½ wave) cable extension while not affected by ½ wave extension.

Stagger tuning was tried to see if this was practical with a four element yagi. It worked in the same manner as with the five element. If there is a real need to cover a wide range of the band this setting could be more effective than the correct tuning. But as there was no need for the full spectrum in this case, correct tuning was adopted. Fig. 6 gives SWR curves for A, normal tuning; B, with ¼ wave extension cable; and C, stagger tuning.

CONCLUSIONS

To withstand all Melbourne's storms ½ inch 20G aluminium tubing has sufficient strength for a 10 metre beam.

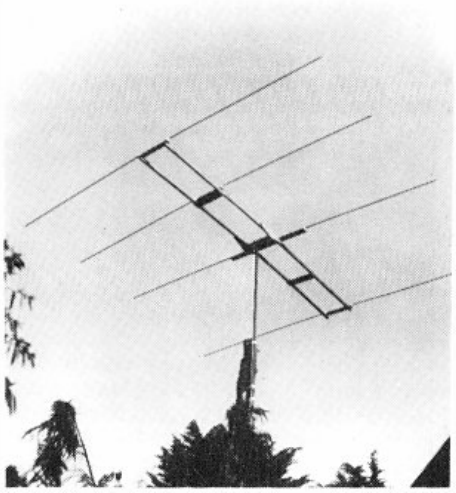

PHOTO 7: Five element — "Too many cooks spoil the broth".

After establishing the length of the dipole to resonate on the design frequency, the length of the reflector and directors can be calculated. To maintain resonance of the antenna on the design frequency only the driven element need be shortened.

Optimum performance of a balun specifically for the 10 metre band is achieved with 6 turns. Omission of the centre equalizing winding eliminates the need for returning the driven element.

If the length of transmission cable is cut to a multiple of ½ wavelength it simplifies matching and tuning adjustments. Specific length improves transmitting and receiving on frequencies away from resonance. (This is debatable!—Tech. Ed.)

The beta match with a balun is superior to the gamma match. On receive the S/N ratio is better (lower noise), and on transmit TVI was not produced.

An antenna impedance bridge is a necessity, a GDO is a luxury and an SWR indicator belongs to every transmitter. ■

Band Plans

(PLEASE READ THE NOTES ALSO)

By mutual agreement, to promote the orderly use of the HF bands, there are gentleman's agreements in use all over the world for the HF bands. These vary from region to region or place to place depending on the widths of each band in use for the amateur service in different places.

In Australia the following are the band agreements in use (including Novices) —

Band	CW only kHz	Ph. & CW kHz
80m	3500-3535	3535-3700
80m Novice	3525-3535	3535-3625
40m	7000-7030	7030-7150
20m	14000-14100	14100-14350
15m	21000-21150	21150-21450
15m Novice	21125-21150	21150-21200
10m	28000-28200	*28200-29700
10m Novice	28100-28200	*28200-28600

* The sub-band 28200-28300 kHz is in use world-wide for beacons and therefore should be avoided for general contacts.

SPECIAL FREQUENCIES

WICEN nets identified as such (in kHz):
Primary: 3600, 7050, 14100
Secondary for CW: 3575, 7025, 14075
for Phone: 3625, 7075, 14125

RTTY, ATV and other modes will be included later when positively identified.

NOTES

1. CW may be used in all parts of these bands.
2. Telephony may *not* be used in the "CW only" parts of the bands.
3. Authorised WIA broadcast frequencies and times are set out in the WIA Directory appearing in each AR.
4. There is a satellite beacon and downlink window in use for the 10 metre band either side of 29500 kHz.
5. In the USA the band segments are specified by FCC Regulations. ■

The Importance of Satellite Communications in Developing Countries

This paper was originally presented at the seminar on computers in developing nations, the proceedings of which will be published by the North-Holland Publishing Company and edited by Prof. J. Bennett, Dr. R. Kalman and Mr. J. Shaw.

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The spectacular way in which communications services using Intelsat facilities have grown in recent years and the rapid spread in small developing countries of the Standard B Intelsat Earth Station and the consequent effects of improved international communications on development are outlined. So are the still unfilled needs for better communications in large rural areas and many settlements on islands and other geographically isolated places. The pressure on the International Telecommunications Union to come up with solutions to this problem has led to a satellite proposal called "Glodom" which is summarised. But Glodom still leaves unfilled an important area now filled in the Pacific by PEACESAT, a low cost satellite providing low density wide area coverage appropriate to Pacific development. PEACESAT is discussed as is the total public service usage of the single voice channel on ATSI. Finally the Amateur Satellite service is discussed and its pioneering contribution to the field of low cost space communication.

The space age has changed completely the whole technology of communications in the last 15 years since the first successful launch of a geostationary satellite. Simultaneously there were several very significant communications break-throughs, any one of which could have brought about a major technological change in world communications.

Radio, High Frequency, Very High Frequency and Ultra High Frequency became possible without vacuum tubes. New high powered solid state components enabled less expensive units of medium power to be introduced — all very much improved in efficiency. For communications single sideband techniques multiplied the spectrum space available by many times for terrestrial point to point communications and computer and digital techniques revolutionised tuning and automatic calling procedures.

About the same time really wideband ocean cables with very simple repeater stations built into them became available and cost effective with other modes of international communications.

But although greatly improved these technologies were not developed to their full new potential because of the advent of the communications satellite and particularly the efficiency and global use of the services provided by Intelsat. Over 100 countries are members of Intelsat. They have money invested in the organisation and now draw financial dividends from it in addition to using it for their extended, efficient and appropriate international public communications services.

Multi-million dollar earth stations have grown like mushrooms throughout the world in member and non-member countries and more recently smaller countries such as those of the pacific and ioslated communities with more limited traffic demands have discovered the smaller standard B earth stations and SCPC (Single Channel per Carrier) operation cost effective for their international requirements.

Of all space operations that of Intelsat, because of its scale and because of the technical efficiency of those behind it has obtained the greatest benefits from its expenditure.

Because of increased and steadily increasing use and new generations of satellites with greater capacity the cost of the space sector in communications has steadily come down.

But the public user has not yet benefited financially. There is today much more invested in the earth stations than in the space sector and with costs on earth tending to increase with inflation both in capital and and in operations the user is paying more, rather than less, for his use of the international communications network for voice and data use.

Nevertheless, the whole system is efficient and cost reductions to the user are probable in the near future.

But despite the efficiency and appropriateness of the Intelsat system for linking the developed countries and the main urban centres of the less developed countries, both large and small, there are many rural areas whose development is greatly hindered by a lack of electrical or electronic communications of any kind. Two years ago there were 420 million telephones world-wide, of these 75 per cent were in eight countries and only 7 per cent altogether in countries classed as developing. Good communications goes hand in hand with development. The gains of telecommunications cannot be measured in terms of the profit or loss made by the telecommunications authorities.

There are many indirect profits from improved telecommunications which in many cases can far exceed the losses which may be made in operating them.

However, the International Telecommunications Union (ITU) realises this and is very conscious of the need for cheaper and more effective communications in rural areas. Other United Nations Agencies have a common interest in seeing improved and less expensive communications in developing countries and have put pressure on the ITU to develop them.

What has so far been proposed is a system called "Glodom", a concept developed by William Pierce of the Technical Co-operation Department of the ITU in Geneva.

GLODOM

This Glodom system uses the same technology, essentially, as Intelsat. A series of satellites would give global coverage with spot beams covering the areas or countries that require the system. Terminals in their simplest and cheapest form would use 3 metre dishes, operate from a 12 volt battery, provide one telephone channel with provision for more to be added and one simplex channel which would be available for teleconferencing to provide very essential education in fact in any field that would accelerate development.

Such a minimum size terminal, if mass produced, could cost as little as $20,000. Glodom plans on the eventual establishment of tens of thousands of such terminals. The total world-wide space segment to go with Glodom would cost at least $200,000,000.

There is no question but that this system or one very similar to it will come into being and will prove more cost effective in linking thousands of settlements in the large underdeveloped countries than any system of reticulated wiring or series of

terrestrial microwave or radio links. However, for a single isolated user the cost is high, even in Australia's outback. Some of the most important significant work done so far in satellite communications over wide areas using very low cost, simple and, where necessary, portable equipment has been carried out over the last decade using NASA's ATS1 and ATS3 satellites.

ATSI AND PEACESAT

These satellites, launched in 1966 and 1967 respectively, are equipped with VHF transponders operating above and below the 2 metre amateur band. They cover a 100 kHz segment with the centre uplink frequency at 149.22 MHz and the centre downlink frequency at 135.60 MHz.

ATS1 is situated on 149 degrees west longitude. This gives it almost complete coverage of the Pacific area, from central Australia to the east coast of the US, from the Arctic to the Antarctic.

For the past 10 years it has been used for many experiments in low cost communications between islands, between institutions and in the Pacific area interested in development and for direct health, educational and scientific purposes.

It has in effect only one voice channel as the normal mode of use FM and if two carriers on different frequencies access the satellite at one time then the output power is shared and received signals deteriorate. So it provides one simplex voice grade circuit or one half telephone circuit. Yet it has given and is giving spectacular service to the Pacific area.

Despite a very expensive upgrading of telecommunications ATS1 is still giving medical service to many isolated locations in Alaska. Nineteen small terminals have, for the last three years, given health and administration communications services to the seven main centres of the Trust Territories of the Pacific Islands, the University of the South Pacific uses ATS1 for administrave purposes and direct teaching tutorials to students in its ten member countries, small oceanographic research vessels use ATS1 for long range communications with their operating bases, many special scientific teams have used it for communications with their bases, the American Lutheran Church has used a small network to join with their Churches in isolated areas of the US and the first service to start using the satellite for health and education, PEACESAT (Pacific Educational and Communications Experiment by Satellite) continues to use the satellie for Pacific wide conferencing for several hours daily.

Efficient time sharing of this one half telephone channel has made all these services possible. This time sharing is coordinated by NASA.

Like all satellite systems that of ATS1 can be used for any communications made possible on a single simplex voice channel.

PEACESAT has used the network for facsimile, slow scan TV, teletype and computer linking. The USP is currently installing computers and slow scan TV in many of its terminals. The Aloha network at the University of Hawaii used it for transmission of computer packets, working in conjunction with various US terminals, Sydney University and Tohuku University in Japan, which latter two are continuing with these experiments.

But the main value of the ATS1 experimental service lies in its provision of conferencing facilities over more than one-third of the globe. The PEACESAT network comprises about 20 terminals, and encourages others to participate.

Any terminal in the network can suggest a topic for a conference or series of conferences and if several terminals favour the topic planning will be done and the series commenced, usually with a specially competent resource person leading the discussion. Whatever the topic, everyone participating can add to the discussion or disagree with anything that is suggested.

In the Cook Islands, which is in a very isolated part of the Pacific, much has been made of PEACESAT and the USP network. In fact about ten per cent of the adult population have taken part in PEACESAT exchanges. Many technical innovations even new crops, have resulted from these exchanges and the total social and development impacts of the experiment, while difficult to evaluate, are certainly worth much more than the small amount of effort and money put into the operation of the network. The free use of ATS1 is probably the greatest single piece of aid that the US has given to the Pacific Region. The fact that ITS has outlived all other geostationary satellites in functional life and still appears to have much useful life ahead is a tribute to the appropriate VHF technology employed. The fact that satisfactory ground terminals operating from a car battery can be set up for as little as $600 when bought off the shelf or be constructed for much less shows how simple the earth sector can be on these frequencies.

Yet the new radio regulations passed at the 1979 World Administrative Radio Conference in Geneva made no provision for the use of VHF frequencies on satellites other than by the Amateur Satellite Service.

The Amateur Satellite service has to date launched ten OSCARs — Orbit Satellites Carrying Amateur Radio. Currently three are in use. Of these satellites amateur stations communicate with each other over long distances in all parts of the world. Many firsts in space have been achieved by amateurs such as the first ever space communications between the US and the Soviet Union in 1965.

Perhaps the main contribution to communications satellites by radio amateurs has been the demonstration of what can be done on a 100 kHz transponder bandwidth by limiting power to the minimum required and operating many single sideband channels simultaneously. Amateurs everywhere had great hopes for AMSAT stage 3 or Oscar 9, which had been scheduled for launch in May of this year. This satellite was to have gone into a very elliptical 12 hour orbit and would have given almost geostationary service to many parts of the world over a large part of each day. Unfortunately a faulty Ariame launch necessitated the destruction of the satellite minutes after take-off. It had taken many many manhours plus materials costing about a quarter million dollars, donated from all over the world, to build. A new launch of a satellite now being built is scheduled for early 1982. It is hoped that this satellite, to an even greater extent than ATS1 and ATS3 will demonstrate the value of VHF satellite communications. It is expected to have more than 5000 regular users.

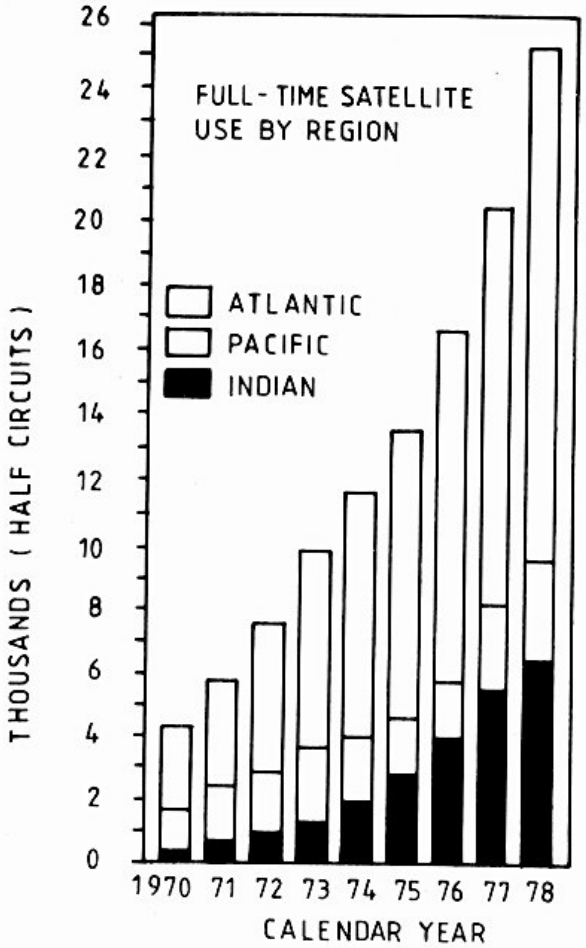
From these brief descriptions it can be seen that space communications offers many possibilities but for that matter so does modern radio communications. Never has it been easier for communications by voice or computer to be conducted between any two points on earth. Amateur radio has enabled individuals in any part of the world to communicate with amateurs in any other part, either through satellites or directly by radio. In either case the equipment needed can be small and portable. When in Geneva at the WARC meeting last year I had daily direct contacts with my home in Rarotonga using small solid state transceivers. Despite a modern trend to rely on satellites for all communications, radio is today very advanced on what it was in the past and without question can fill many of the needs of developing countries.

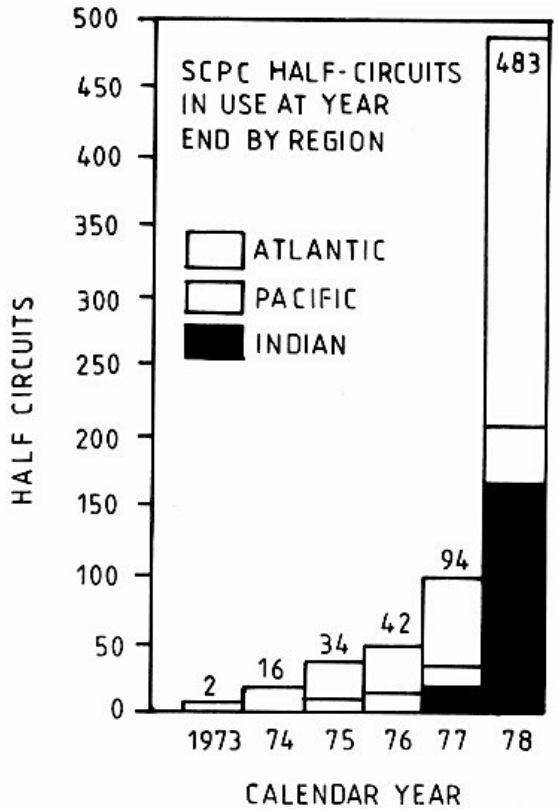
PEACESAT has, more than anything else, demonstrated the value of direct communications between institutions, particularly Universities and those engaged in medical, health or scientific research, and between those institutions and persons associated with them in field work.

The requirements for such communications will continue and grow in both developed and developing countries — it must if development is to be accelerated in fields such as health, education, science, energy and social development. But such communications must be as free as possible to allow institutions to do their own thing, to develop their own appropriate networks rather than be tied to what, for these purposes, is a grossly expensive public communications service. Just as telecommunications authorities allow individuals as radio amateurs to conduct their own communications of a non-commercial nature so they must allow institutions to do the same thing. Just as radio amateurs have their exclusive allocations of spectrum space for both terrestrial and space communications so should universities and similar institutions. And at any future World Administrative Radio Conference some VHF allocations should be given for satellite services like those now provided by ATS1.

Appendix

The following graph, taken from the annual report of INTELSAT 1979, gives an indication of the spectacular growth of that organisation.





CALENDAR YEAR	ATLANTIC	PACIFIC	INDIAN	TOTAL
1965	150	—	—	150
1966	172	—	—	172
1967	418	270	—	688
1968	720	422	—	1·142
1969	1·829	904	102	2·835
1970	2·633	1·312	314	4·259
1971	3·514	1·654	654	5·822
1972	4·748	1·849	900	7·497
1973	6·291	2·251	1·272	9·814
1974	7·695	1·859	1·953	11·507
1975	8·862	1·926	2·581	13·369
1976	10·783	1·972	3·765	16·520
1977	13·002	2·234	4·970	20·206
1978	16·260	2·940	6·077	25·277

CALENDAR YEAR	ATLANTIC	PACIFIC	INDIAN	TOTAL
1973	2	—	—	2
1974	16	—	—	16
1975	30	4	—	34
1976	36	6	—	42
1977	70	12	12	94
1978	286	40	157	483

WIA (FEDERAL) DIRECTORY

MEMBERS OF EXECUTIVE
Mr. P. A. Wolfenden VK3ZPA, Federal President.
Mr. K. C. Seddon VK3ACS, Exec. Vice-Chairman.
Mr. H. L. Hepburn VK3AFQ, Member.
Mr. C. D. H. Scott VK3BNG, Hon. Treasurer.
Mr. B. Bathols VK3UV, Member.
Mr. W. E. J. Roper VK3ARZ, Member.
Secretary: Peter B. Dodd VK3CIF.
Amateur Radio: Mr. Bill Baly.

IMMEDIATE PAST FEDERAL PRESIDENT
Dr. D. A. Wardlaw VK3ADW.

IARU LIAISON OFFICER
Mr. M. J. Owen VK3KI.

INTRUDER WATCH CO-ORDINATOR
Mr. G. J. Fuller VK3NXI

FEDERAL REPEATER SUB-COMMITTEE
Mr. K. C. Seddon VK3ACS, Chairman.
Mr. J. J. L. Martin VK3ZJC.
Mr. P. B. Mill VK3ZPP.

EDITOR AND CHAIRMAN OF PUBLICATIONS COMMITTEE
Mr. B. Bathols VK3UV.

FEDERAL BROADCAST TAPE CO-ORDINATORS:
Mr. R. Fisher VK3OM.
Mr. W. Roper VK3ARZ.

FEDERAL EDUCATION CO-ORDINATOR
Mr. R. E. Hartkopf VK3AOH.

FEDERAL HISTORIAN
Mr. G. M. Hull VK3ZS.

FEDERAL CONTESTS MANAGER
Mr. W. A. Watkins VK2DEW

FEDERAL AWARDS MANAGER
Mr. W. D. Verrall VK5WV.

FEDERAL VHF/UHF ADVISORY COMMITTEE
Mr. W. M. Rice VK3ADP.
Mr. P. A. Wolfenden VK3ZPA.
Mr. I. W. Cowan VK3BGH.
Mr. L. Janes, VK3BKF.
Mr. J. J. L. Martin VK3ZJC.
Mr. K. L. Phillips VK3AUQ.

FEDERAL RTTY COMMITTEE

PROJECT ASERT COMMITTEE

Mr. P. A. Wolfenden, VK3ZPA/NIB.
Mr. K. G. McCracken VK2CAX.
Mr. L. Janes VK3BKF.
Mr. G. C. Brown VK3YGB.

AMATEUR SATELLITES
Mr. R. C. Arnold VK3ZBB.

FEDERAL WICEN CO-ORDINATOR
Mr. R. G. Henderson VK1RH.

VK/ZL/O CONTEST MANAGER (VK)
Mr. N. R. Penfold VK6NE.

FEDERAL VIDEOTAPE CO-ORDINATOR
Mr. J. F. Ingham VK5KG.

FEDERAL COUNCILLORS
Please see main Directory.

ALTERNATE FEDERAL COUNCILLORS
VK1 — Mr. A. Davis VK1DA.
VK2 — Mr. W. A. Watkins VK2DEW.
VK3 — Mr. A. R. Noble VK3BBM.
Mr. G. F. Atkinson VK3YFA.
VK4 — Mr. D. T. Laurie VK4DT.
VK5 — Mr. W. M. H. Wardrop VK5AWM.
VK6 — Mr. P. J. Savage VK6NCP.
Mr. B. Hedland-Thomas VK6OO.
VK7 — Mr. R. K. Emmett VK7AK.

MORSE EXAMS

Candidates for morse exams are specially reminded that the morse sending or receiving of letters is not adequate in itself. There is a space of 7 dots between words and this has to be observed so that whatever is sent or written down should be in understandable composition English. Thus, to omit a space between two words is one error. Many errors could be recorded against you if, for example, in receiving morse, you write down a string of letters not separated into discrete words. This reminder is given to dispel any rumours to the contrary and to alert candidates to the official requirements. ■

Are you checking our bands for

INTRUDERS

AND REPORTING SAME TO THE INTRUDER WATCH CO-ORDINATOR?

VK2 MINIBULLETIN

AOCP EXAM DATE CHANGE

The next AOCP exam conducted by the D of C in Sydney would normally take place on the third Tuesday in August. However, for this year in Sydney ONLY the AOCP exam will be held on the first Tuesday in September, i.e., TUESDAY, 1st SEPTEMBER, at Macquarie University. Apparently the University is not available on the usual exam date. Elsewhere in NSW the exam will be held as usual on the third Tuesday in August, the 18th. The closing date for enrolment in the exam, 8th July, remains the same for both city and country applicants.

ON-AIR GAMES

Several amateurs have rung the DOC in Sydney recently seeking clarification on the playing of games on air. Departmental enquiries reveal that there have been no changes to regulations on this subject, despite proposed changes in Third Party Traffic privileges. Amateurs are asked to note that the playing of games via amateur radio is not permitted.

COUNCIL REPORT

$260 has been donated to the Tower Fund (see February AR) to date (1/3/81). Thanks for recent donations of $50 from Coffs Harbour ADARC and $10 from M. McCulloch. A Town Planner has been hired by Mr. Martyn's counsel to advise his barrister. The Town Planner's services cost $40-$60 per hour, so any donations to help Mr. Martyn defray costs will be gratefully received by Council. Please send donations to Box 123, St. Leonards 2065, with cheques written out to the WIA.

The Division's Property Officer, Henry Lundell VK2ZHE, conducted a stock-take at Atchison Street in February. In order to ensure that the 1981 stock-take is accurate, Council requests that anyone holding equipment owned by the Division notify the Secretary by phone or letter by 30th May. Please include serial numbers and the use to which the equipment is being put. Any equipment not being used should be returned to Atchison Street.

WIRELESS INSTITUTE CENTRE

The WIC at 14 Atchison Street, Crows Nest, is used by various groups every day of the week. Below is a list of groups meeting there which may be of interest to members.

Microprocessor Enthusiasts' Group (MEGS): 1st and 3rd Monday nights.

RTTY Group: 1st Friday night of even months, 7.30 p.m.

VHF AND TV Group: 1st Friday nights of odd months, 7.30 p.m.

Sorcerer Users' Group (SUGS): 3rd Friday nights.

Novice Amateur Radio Group (WIA Affiliated): Saturdays, 1-5 p.m.

Anyone interested in finding out more about these groups can ring the Divisional office on (02) 43 5795 between 9.45-1.45 p.m. on Tuesdays or Thursdays, or write to Box 123, St. Leonards 2065.

GOSFORD FIELD DAY

770 amateurs and other interested people attended the 22nd Annual Gosford Field Day on Sunday, 22nd February last. There were the usual ecellent trade displays, ladies' stalls, disposals markets (350 items sold) and local trips. The results of the field events were: VHF scramble, Eric 2ZUR; HF scramble, Les 2ALK; junior pedestrian hunts, Jamie Harrison, Mark Hale, Craig Brewer and Craig 2VZL/YXN; open pedestrian hunts, Les 2ALK, Doug 2ZYM and Paul 2BZC; long DF hunt, Steve 2ZEY (2m), Athol 2BAD (10m); overall winners, Les 2ALK senior; Craig 2VZL/YXN junior; raffle, Pierce 2APQ; ladies' quiz, M. Silk; ham quiz, Sue 2BSB. Central Coast ARC would like to thank all those who helped make the day a success.

URUNGA FIELD DAY

Coffs Harbour and District Amateur Radio Club announce that the 35th Annual Urunga Convention and Field Day will be held over the Easter weekend, Saturday 18th and Sunday 19th April. Registration will be at 8 p.m. on Friday, 17th April, at the Ocean View Hotel, Urunga. Events proposed include a 40m DF hunt, 2 x 2m pedestrian hunts, 2 x 2 TX DF hunts on 2m, 2 talk in hunts on 2 and 10m, and an all band scramble. As well as the usual Saturday evening film night and supper, there will be lucky dips, trade displays, for sale and swap table, repeater fund raffle and a lucky door prize. The Saturday events will be at Urunga and the Sunday events at Bellingen Showground. For further information or a programme, call in on the Coffs Harbour ADARC net, Mondays 8 p.m., on 3610 kHz, write to PO Box 655, Coffs Harbour 2450, or ring (066) 55 1115.

Details of three clubs affiliated with the NSW Division.

NOVICE AMATEUR RADIO GROUP

Box 128, Pyrmont 2009.

Meetings and classes: February-May, June-November, Saturdays 1-5 p.m., at 14 Atchison Street, Crows Nest.

President, T. Krakowszky; Vice-President, M. Price VK2VUA/YTF; Secretary, F. Tam VK2VRL; Other Committee, A. Hinvest VK2DSP, J. Gallagher VK2PBW, L. Dupont VK2PBB, D. Jones VK2PBI.

The group operates only when classes are in progress.

BATHURST AMATEUR RADIO GROUP

Box 755, Bathurst 2795.

Meetings: SES headquarters, George Street, Bathurst, 3rd Fridays at 8 p.m.

President, G. Burge VK2BVU; Vice-President, N. Sweetnam VK2DLG; Secretary, G. Godfrey VK2NZZ; Other Committee, M. Salmon VK2DLD, S. Morriss VK2DLL, I. Denmead VK2VFY.

GUNNEDAH AND DISTRICTS AMATEUR RADIO GROUP

"Womboyne", Kelvin 2380.

Meetings: 1st Thursdays at Gunnedah Scout Hall.
President, S. Lister VK2ADS; Vice-President, B. Harwood VK2ZAY/VLD; Secretary, J. Watson VK2ZQX.

Club call: VK2DEO.

Repeater: VHF VK2RAB, channel 6850, at Gunnedah.

☆

COMING EVENTS

18th and 19th April (Saturday and Sunday): 35th Urunga Field Day.

3rd May (Sunday), 8 a.m.: Club liaison net on 3575 kHz.

12th April (Sunday), 10 a.m.: Informal meeting at WIC to discuss Federal Convention Agenda.

16th April (Thursday): Close of agenda for 4th C of C.

24th May (Sunday), 10 a.m.: Fourth Conference of Clubs at Goulburn RSL Club, Market Street, Goulburn.

30th May (Saturday), 2 p.m.: Divisional Auction, 14 Atchison Street, Crows Nest.

News for inclusion in the VK2 Minibulletin must reach Box 123, St. Leonards 2065, two days before the first of the month prior to publication, e.g. by 28th April for June AR.

Susan Brown VK2BSB. ■

VK2 VHF & TV GROUP ANNUAL ELECTIONS

Members of this Group are advised that elections for Group Committee will be conducted at the meeting on Friday evening, 1st May 1981, to be held at 14 Atchison St., Crows Nest, at 7.30 p.m.

Nominations will be received at the meeting from financial Members of the Institute. Committee duties include the conduct of meetings (held first Friday of the odd months); Conducting of Sunday evening broadcasts on behalf of the Division; Involvement and assistance in VK2 on matters pertaining to the VHF and higher bands.

M. Farrel VK2AM, Secretary ■

QRK5

A monthly transmission from the Victorian Division WIA.

By the time you come to read this I imagine that the abundance of conventions, trade displays and what-have-you will be a thing of the past, and we'll be able to settle back into our everyday routines once more. Before you file these events to the dusty archives of your memory banks, however, spare a thought for all those people who brought those functions to fruition — the organisers, exhibitors, guest speakers and so on. It is a long list, and few did it for anyone else than YOU, the radio amateur. So like I said, spare a thought of thanks to these folk who worked so hard for your benefit. Better still, if you know any of them, let them know that you appreciate their efforts. Everyone likes a pat on the head once in a while.

I'm still not sure just exactly how I "volunteered" for this chore, but somehow your previous scribe — "Three Whisky Whisky" — managed to sweet-talk me into it. Mike, of course, is moving away from the Melbourne scene and intends, so I understand, to grow himself an aerial farm. The very best of luck to you, Mike, and thank you for the many "Hats" which you wore so well.

From that you might conclude that his leaving will leave a few positions vacant around the VK3 Division — and you would be right — Librarian, Councillor, Chief Thug . . . Oh yes, and thereby hangs a tale. Last Thursday, 6th February, we had to elect a new Chief Thug. Nothing democratic about this election, though, it was a case of last one out through the door loses, with the honour falling to Ray VK3DL. Congratulations, Ray, and may the power of the Blue Quaft be with you.

Have had quite a few comments about the name of this column, QRK-5, by the way. The best to date was from the holder of an AOCP who said, "QRK-5? I thought that was the South Australian column so I didn't read it!". One can only wonder how he passed his regulations exam. I must advise you all, though, that despite intense pressure being brought to bear (two persons) I will maintain the present title mainly, I guess, because I can't think of anything more appropriate. If you have any strong feelings about this then write and tell me. I am QTHR.

The only items of correspondence is reproduced herewith for your perusal. This writer offers no comment, save for wholehearted agreement.

Dear Sir,

It has been with some amazement that I have been following the correspondence from VK3NWO and VK3ZFA in your columns.

I think that both have put forward arguments which are valid and pertinent. However, they are tending to lose sight of the basic aim of amateur radio which is comradeship in a common hobby.

As the Novice, Limited and "Full" calls are all LICENSED by the DOC, let's have an end to all this sniping at each other, and present a united front as amateurs.

Yours faithfully.

VK3KBA.

I must admit that the new "K" calls have me intrigued — what does the "K" stand for? Kombi, perhaps. Whatever, they seem to be a good idea to me, although I suspect that one group of amateurs may not be too thrilled with the idea. I'm referring to those normally silent folk who "sandbag" on the repeaters just waiting for a dual call holder to accidentally drop his Novice call sign. At that time they've been "in" — boots and all, reminding me vaguely of a vulture with the vapours. What will they do for "kicks" now? Or are there a few stalwarts amongst you who'll retain both calls just in order to keep these mugwumps happy?

The topic of conversation at a well wetted watering hole near the VK3 rooms recently was the concept of an Advanced Grade of Amateur Licence. The examination questions for such licence could concentrate on such esoteric subjects as ATV, RTTY, FAX, Digital, and the like with, say, a 20 w.p.m. CW test. One well known — dare I say, "well OILed" gentleman suggested that DOC should rescind all the two letters calls and reserve them for advanced grade amateurs. No wonder they make jokes about Irishmen if they come up with suggestions like that!

Sacred cows department. There's no denying that the use of phonetics is desirable, even mandatory under conditions of poor transmission/reception. I fail to be impressed by those enthusiasts who insist on using phonetic call sign identification on 2 metres FM under ideal communication and quality conditions. Most times I'm left slightly breathless wondering what was all that verbosity about. Come on, fellas, let commonsense prevail. I suppose that while I'm bashing the beloved bovine I may as well spare space for those who call a station and end with "Are you there?" or words to that effect. These same geniuses are those who will omit the VK3 bit from all call signs, in the interests of brevity! If you think about these problems for a moment you'll realise that if the person called IS there, he'll answer, and if he's NOT there how can he answer? So the question is redundant and should be deleted in the interests of good operating procedure.

Finally, for this month, it's time for the annual elections once more. It's really astounding how many there are in our fraternity who will carp and criticize the work of others all year, but at this time — like the toothpaste advertisement — just fade away. Your Division needs new blood, new ideas, new expertise and energy. Are you concerned about what we are going to do in the 80s; are you prepared to be involved, to give time and effort? If so, we'd like to hear from you. Maybe this isn't your "thing" but you know someone who would suit, and who would be willing. Talk to him/her, and do your bit by nominating that person. But please, PLEASE don't sit back and wait for someone else to dot it, as it won't get done.

Get that news/gossip rolling in, folk, and I'll see you all next month.

73s. Peter VK3JN. ■

QRM

The Monthly Bulletin from the Tasmanian Division WIA

This month sees the start of what is hoped to be a long and happy relationship between AR and the VK7 Division. The Bulletin QRM has been in existence in VK7 for 10 years, firstly as a publication for the Northern and North Western Branches of the Division and then over the past three years or so became the means of communication for news from all the Branches as well as Divisional Council. Unfortunately, like most things today, the ravages of economics caught up with us and a decision had to be made. What to do about QRM? The outcome of that decision you are now reading. It is hoped that, through these columns, that you, the reader, will better understand what is happening in VK7.

NORTHERN BRANCH NEWS

The February meeting was a very successful one from the point of view of membership involvement. It is pleasing to the office-bearers to see members actively interested in the Branch's future. On the financial scene, the Branch's future looks quite healthy. The club station VK7NB is hoped to be used more often this year, so keep an ear open for it.

NEW MEMBERS

The Branch welcomes Mr. Donald Bartley VK7NDI, and Mr. Ken Clark, Associate, to its ranks and hopes to see them at future meetings and activities. ■

REPEATER 8

The rebuilding programme is coming along slowly and it is hoped that this project may soon come to a conclusion. Tests are being carried out on this repeater for the relaying of the other two repeaters (Repeater 2 in Hobart and Repeater 3 in the Northwest) for Divisional broadcast purposes — further information when available.

NORTHWEST BRANCH NOTES

The AGM of this Branch was held in February, with the outgoing President, Peter VK7BQ, outlining to the meeting the aims and objectives that were dealt with during the past twelve months. He also expressed his thanks to members in the way in which they raised funds for the ATV and VHF repeaters, which are now nearing completion. On the financial side of things, the Branch had a very satisfactory year. The reins have now been handed over to Martin VK7MM and his henchmen for the year 1981.

As this is the year of the disabled, a Northwest net is being operated every day at 2230 on 3.600 MHz and this Branch is looking forward to operators on this frequency.

NEW MEMBER

The Branch welcomes Phillip van Beek, of Ulverstone, and hopes to see him at meetings soon.

COUNCIL NEWS

The Federal Councillor for the year 1981 is Peter Fudge VK7BQ, and the alternate councillor is Mike Hennessey VK7MC.

Members are reminded that membership subscriptions are now overdue. If someone says "I did not receive my AR" you can tell them why.

73. Brian Yeoman VK7ZBY. ■

QSP

EXAM QUESTIONS AND ANSWERS

How to pass examinations the easy way. How to qualify without knowing a thing about the subject. Instant licensing. Degrading the service. Throw pride of achievement out of the window. The black box syndrome. And so on. The editorial from Ham Radio December 1980 addresses the problem and here are some quotes:

"It seems that a West Coast Amateur has decided to make some easy money by publishing material to aid prospective licensees in passing FCC Amateur examinations. His material is crafted so that mere memorization of answers to FCC exam questions practically guarantees a passing grade. His product apparently is derived from FCC exam materials. Such material is gleaned by a well-organized effort to collect questions verbatim from the various exams when they are administered by FCC representatives. Very often this has happened at Radio Amateur conclaves and conventions."

"Where do these questions and answers come from? From Radio Amateurs. The publisher in question solicits FCC test questions from those who have recently taken the exam, then publishes these questions along with the proper answers. Pretty neat. All one has to do is memorize the questions and answers, and the exam is a comparative cinch."

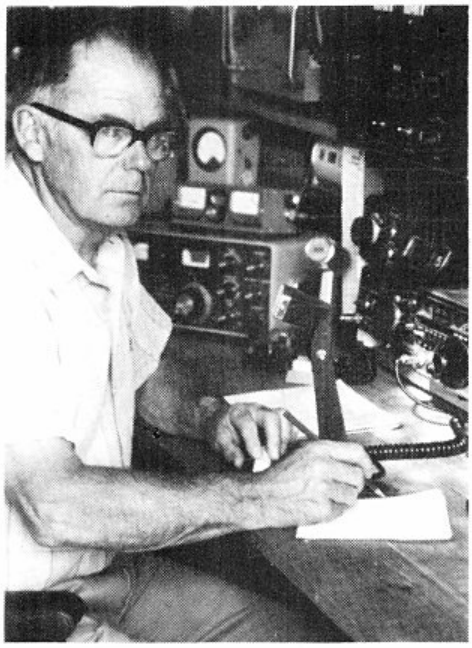
"All prospective Amateurs should take a closer look at this problem. We licensed Amateurs who organize training classes and other tutorial endeavours have a special responsibility in this regard. Obtaining an Amateur licence requires some effort. It is usually a difficult, time-consuming process. The successful licence applicant will find the process rewarding for years to come."

"The Amateur Radio Service cannot survive if licences are obtained without due regard to technical knowledge: that is, passing FCC exams by learning the questions and answers by rote." ■

VHF-UHF

An expanding world

Eric Jamieson, VK5LP
Forreston, S.A. 5233



APRIL 1981

VHF/UHF BEACONS

Freq.	Call Sign	Location
28.335	VK2WI	Sydney
50.005	H44HIR	Honiara
50.100	KH6EQI	Pearl Harbour
51.022	ZL1UHF	Auckland
51.999	YJ8PV	Vanuata
52.013	P29SIX	New Guinea
52.150	VK5KK	Arthurton
52.200	VK8VF	Darwin
52.250	ZL2VHM	Palmerston North
52.300	VK6RTV	Perth
52.320	VK6RTT	Carnarvon
52.330	VK3RGG	Geelong
52.350	VK6RTU	Kalgoorlie
52.370	VK7RST	Hobart
52.400	VK7RNT	Launceston
52.425	VK2RAB	Gunnedah
52.435	VK3RMV	Hamilton *
52.440	VK4RTL	Townsville
52.450	VK2WI	Sydney
52.500	JA2IGY	Mie
52.510	ZL2MHF	Mt. Climie
52.800	VK6RTW	Albany
53.000	VK5VF	Mt. Lofty
144.010	VK2WI	Sydney
144.162	VK3RGI	Gippsland
144.400	VK4RTT	Mt. Mowbullan
144.475	VK1RTA	Canberra
144.500	VK6RTW	Albany
144.600	VK6RTT	Carnarvon
144.700	VK3RTG	Vermont
144.800	VK5VF	Mt. Lofty
144.900	VK7RTX	Launceston
145.000	VK6RTV	Perth
147.400	VK2RCW	Sydney
432.400	VK4RBB	Brisbane
432.450	VK3RMB	Mt. Bunningyong
10.3 GHz	VK6RVF	Perth

* Denotes a change of call sign. Steve VK3OT advises his beacon has received official approval to operate with the call sign VK3RMV.

Last month I spent some considerable time on the subject of beacons, but it is too early at this writing for anything to come back from the comments outlined. Some on-air comments in VK5 seem to indicate that some beacons are too high in frequency, including those in VK5 — the antenna gain of some of the better narrow bandwidth antennae could start falling off a t144.800 with consequent loss of a weak signal in other States. 30 watts of output power seems mostly acceptable and I have overheard discussions that the VK5 beacons are too high on Mt. Lofty and too far from the sea and they would serve a much better purpose as an indicator of actual Adelaide activity if they were located on the Adelaide Plains, possibly from high sites on the Queen Elizabeth Hospital or Modbury Hospital. Possibly in these positions the beacons would not have to be looked through when operating to VK3 as they do now. Anyway, by the time the next lot of notes is due there may be some feedback from the March issue.

Some operators have suggested I try and obtain information from the custodians of the various beacons as to the type of antenna in use, height a.s.l., power and e.r.p., form of ident, location, etc. In order that this information might be gathered would the various custodians please let me have the relevant information as soon as possible so it may be distributed.

Peter Taylor H44PT is the new President of the Solomon Islands Radio Society, and advises the beacon H44HIR is now operating 24 hours a day on 50.005, running 10 watts to a vertically polarized dipole. Reports to Peter, care of P.O. Box 418, Honiara, Solomon Islands. Thanks to Peter Dodd, WIA Headquarters, for that lot.

MELBOURNE LETTER

Gil VK3AUI sent me a photo of the reception report received in Melbourne by 3FOX FM from Mar Del Plata, Argentina, which is 400 km south of Buenos Aires. The report was from a member of the Marpla DX Club for 13/9/80 at 1829 Melbourne time on 101.9 MHz, and S2 on 5 point SINPO scale. Sufficient information was sent to enable the station to verify the report, which might have led to a possible extension to 2 metres had more been known about the reception.

"3FOX FM has 10 kW ERP of mixed polarization. They use a beam centred on Geelong from Mt. Dandenong on the Channel 10 (ex 0) tower, and the beam is such as to cover the Mornington Peninsula and the northern suburbs of Melbourne. Buenos Aires would be within the beam. The transmitter puts 2.7 kW RMS into the feedline.

"Other FM stations may have been heard but the interval between idents and ads may have been too long. FOX had only been on the air for about one month and EON was similar. The only other station likely would be the ABC, but their idents tend to be fewer. The other stations, 3MBS, 3RRR and 3PBS, have either low power or are on very odd transmission schedules."

Thanks, Gil, for passing that on, quite an interesting event — I wonder what the station operators thought about the reception report?

Gil also advises 6 metre activity in Melbourne was good during January. He was able to work H44PT, P29DJ, FK8BG and YJ8PD. Also a good VK1 opening as well as JAs and ZL. Missed VK8 but got VK2, 4 and 6 and 7.

70 cm ACROSS FROM NEW ZEALAND

Ross VK2ZRU has written with some details of the 70 cm opening to New Zealand on 26/1 and 27/1. Opened at 0950Z and continued to after 1300Z on 26/1 when VK2ZRU, VK2BDN and VK2BSV worked ZL1AXX, ZL1TAB and ZL1AVZ, and ZL1TCX. On 27/1 ZL1THG at 0920 to 1040Z worked by VK2BDN and VK2ZRU. Signals were 5 x 1 to 5 x 8 with long slow fades. Dick VK2BDN tried both nights with 50 watts of 1296 MHz SSB without success.

Ross VK2ZRU runs 40 watts SSB to an 18 element yagi and receive pre-amp; Dick VK2BDN 100 watts PEP on 1296 MHz to four 6 element loop yagis and 250 watts on 432 MHz to 88 elements of yagis.

TRANS-TASMAN VHF AND UHF PROPAGATION

Relevant to the above is the following taken from "The Propagator" for February 1981, and supplied by **Lyle VK2ALU.**

"Checks for reception of 70 cm beacons in ZL have been made over recent weeks at VK2ALU, when weather patterns seemed at all likely to support propagation across the Tasman.

"The ZL2VHP beacon at Palmerston North on 433.250 MHz was heard for approximately 1½ hours from 0420Z on Saturday, 10/1/81, at up to 2 S-points above noise, with slow QSB. A subsequent check of weather maps for Friday and Saturday indicated that a ridge of high pressure may have supported Trans-Tasman propagation from early morning on Saturday, 10/1/81.

"No other ZL 70 cm beacons were heard, nor any other signals on this band, and calls on the ZL calling frequency of 432.2 got no response. A phone call to ZL1THG was unsuccessful because he was at work. VK2BDN was then phoned, to activate any possible Sydney stations with suitable capability, but as far as is known no contacts were made. A quick check of the two metre band showed it to be relatively lively but still no sign of ZL signals.

"ZL1THG has since advised that ZL2TAL identified two VK2 repeaters on

146.7 and 146.9 MHz between 0900 and 1100Z on 10/1, and he states also that VKs have been heard spasmodically on two metres over recent times.

"It seems rather a coincidence that the first known 70 cm opening between VK and ZL occurred on 9/1/79, almost two years to the day before the latest opening. A difference was however that the isobaric weather pattern was not nearly as complex during the recent opening, which leads one to suspect that openings may occur more regularly than is realised, when ducts form which support 70 cm signals but not 2 metre signals. Accordingly, a more effective check has now been started at VK2ALU, using slow speed chart recorder to monitor 433.25 MHz with antenna pointed towards ZL when the weather map looks promising.

"It is known VK2ZQT is getting set up with stacked yagi antennae on 70 cm pointing towards New Zealand, and hopes to be able to start similar checks. VK2ZLX near Nowra is also looking across the Tasman on two metres with a good antenna system and adequate transmit power."

NEWS FROM BOORAGOON

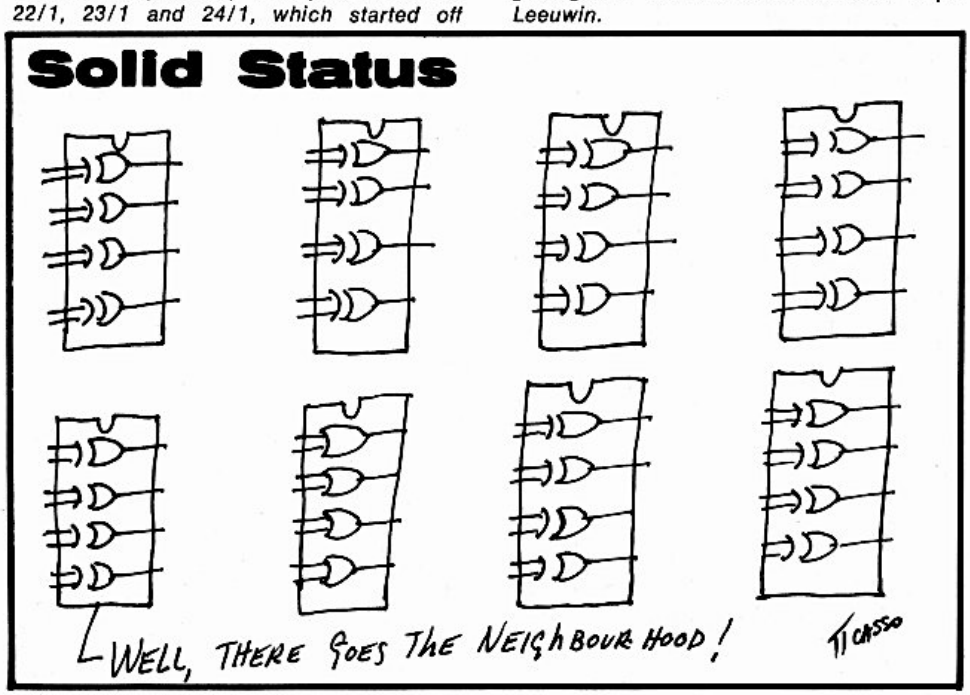
Wally VK6KZ has sent a very interesting letter from his QTH at the Perth suburb of Booragoon, extracts from which are included:

"Firstly I am postulating the theory that the DX season has been a poor one in VK6 due to the long wave weather pattern for the southern hemisphere which has had a major ridge at 110° E, i.e. in the Indian Ocean, west of WA, and hence the Great Australian Bight has only received a series of fairly fast moving highs of central pressures about 1022 to 1024 millibars, whereas two years ago the pattern had its ridge in the Bight.

"I made one foray only to the South Coast, namely the trip to Cape Leeuwin on 22/1, 23/1 and 24/1, which started off with some good north-south DX. The highlights were working Don Graham VK6HK at 1145Z on 22/1 on 1296 MHz initially CW from me and SSB from Don, but the fault in my SSB was later fixed and we had signals ranging initially from 5 x 3 to Don and 559 from me to 5 x 9 on SSB. Then at 1225Z we made it on 2304 MHz CW, Don being 419 and me 429, although I did copy Don on FM just briefly. Power levels on 1296 were both about 1 watt whereas on 2304 I had 1 watt and Don about ½ watt. We are both using 90 cm parabolic dishes, Don using a log periodic multiband feed for 1.3 to 5.7 GHz, whereas I changed over my dipole feeds.

"The path was 274 km — far short of the VK6KZ/P and VK5MC distance on 1296 and the VK5QR to VK6WG path on 2304 MHz. It was exciting though. We tried 3456 MHz but had no success which was not surprising since Don and I had only just achieved the QTH/QTH path of 15 km on that band and had yet to optimise our present gear on that frequency. The 1296 MHz path was checked again with good results on the morning of 24/1 before I left for Perth. Actually 1296 and 432 MHz were reported better than on 144 MHz!

"However, east/west it was a different story. On 23/1 at night conditions north/south were just so-so, and no signals from VK5, and the Albany beacon was weak. Imagine my surprise when on Saturday morning, 24/1, I found out that the Albany boys had been working Adelaide and Reg VK5QR and Bernie VK6KJ had had a long crossband QSO on 1296 MHz. To rub it in, after finishing talking to VK6WG, I heard he and VK6KJ working both VK5ATD and VK3AOS! There was no sign whatsoever of the VK5 or VK3 signals or VK5VF beacon. It appeared that the high pressure cell must have moved fairly fast on 23/1 and I missed out or else the mechanism for getting into the duct didn't form at Cape Leeuwin.



A TRY FROM ESPERANCE

Wally VK6KZ continues:

"My second journey to the South Coast took me to Esperance and at 1152Z on 30/1 on Wireless Hill at Esperance heard VK5VF, but nil from Perth. Worked Peter VK5ZPS and Bob VK5ZRO on 144 MHz. Also worked VK5ZRO on 432 5 x 1 both ways, although conditions did improve later. Worked VK6WG Albany, VK6NL Denmark and Reg VK5QR. Despite VK6WG's reception on 1296 and 2304 MHz of signals from VK5QR I did not hear anything of Reg on either band. Esperance is 4½° off the Adelaide/Albany line. On 24/1 next morning worked VK6WG againln on 144 MHz but had no luck from Esperance on 432, 1296 or 2304 MHz! Esperance to Albany is 390 km and to Adelaide 1533 km."

Thank you for the information, Wal, makes good reading and helps to keep others informed and we hope interested enough to try as well. As a matter of fact, I was pleased to be able to act as host to Wal recently for a night and morning when he paid me a State visit and we covered a lot of territory in discussions. One point which did come from the discussions is the continuing problem on 144.100 MHz calling frequency where QSOs are being continued after making contact and making it difficult for others to use it. I, together with most others, occasionally fail to move off the calling frequency myself, but I do try and shift 10 to 20 kHz at least after establishing a contact. Wal certainly feels that had the frequency been clear it would have helped during the Perth/Adelaide 2 metre contacts in January 1980 and the most recent ones on 28/12/80 at about 2200Z. So once more let's all try and be helpful and shift off the frequency after contact has been established.

MOBILE OPERATION

On 14/2 **Bob VK5ZRO** made what would normally be long hours of travelling into an interesting pediod while on the way to Melbourne by using his 10 watt mobile on both FM and SSB to make contact with Steve VK5AIM/P and Ken VK5EA/P, who went out on a hill near Mt. Gawler in the Mt. Crawford Forest area.

The parties were obviously aided by a good set of conditions, but Adelaide Channel 8 repeater was finally lost at Nhill in Victoria, whilst Channel 7 at Mt. William was accessed at Coomandook in SA. Contact was maintained with those in SA by switching from Channel 8 to Channel 7, depending on the terrain Bob was passing through at the time. From Keith the parties found the direct path was superior to either repeater. Contact was made again at Bordertown at 1008Z and maintained through to Kaniva. Trevor VK5ADY/P was also out on a hill near One Tree Hill and was able to maintain contact until finally signing with Bob when he was at Horsham!

Most of the time there was little difference on direct paths between FW and SSB as vertical polarisation was used on both.

Steve and Ken used 10 watts to a 3 element vertical beam, whilst Bob had a vertical whip. All this goes to show what can be done and what fun you can have if you like to make some effort and prior arrangements. But to show the difference good conditions can make, on the return journey Bob was unable to make contact with the same parties until about Tailem Bend, less than 100 km from Adelaide.

THE WEST FADES OUT

Tony VK6BV reports activity from the Northam area dropped off very rapidly from 1/1/81 when 6 metres started closing down! Contacts were made to VK5 on 1/1, 2/1, 3/1, 4/1, 5/1, then to VK4 on 8/1, same day ZL TV audio followed by VK1 and VK7. The beacons VK5VF, VK5KK and VK3OT were audible at varying times during the first 15 days of the month when Tony went on leave. On 10/1 video noted on 48.250 and 49.750 at 0700Z.

Part of Tony's holiday was spent in Kalgoorlie where he found a lack of six metre activity, or even operational gear, which is a pity.

Also from the West, most are now aware that *Andy VK6OX* is no longer at Carnarvon, having accepted a position at Kyogle in northern NSW, and as reported in the February issue, just to leave a lasting impression of his activities whilst in Carnarvon worked G4BPY and others in G-land crossband 52 to 10 metres. He was heard and worked here from his new QTH on 1/281 with extremely strong signals, so we will be hearing more of Andy in the future.

ANOTHER NEWS BULLETIN

For the first time in a long time a new news bulletin has arrived at my desk. It is from the Liverpool and Districts Amateur Radio Club and sent per courtesy of **Nev VK2ZBQ** to whom I say thank you and look forward to receiving further copies.

From its pages I note a number of operators worked into New Zealand on 26/1 and 27/1 on SSB. **Barry VK2AHE/P** worked a ZL for 40 minutes on 432.200 MHz with armchair copy all the way. **Neville VK2YNB** also made several good SSB contacts. As far as is known no FM contacts were made.

On the same dates mentioned 2 metres was quite congested, and it was reported that on FM simplex there was standing room only for VK and ZL operators! During this two day period **Bob VK2ASZ** worked 35 ZLs on 2 metres! One ZL reported to have worked 52 VK stations. ZL1 and ZL3 main areas worked.

THE LOCAL SCENE

Activity on 6 metres has continued at a reduced pace, but still openings to various parts of Japan on at least 8 days in Februrary. Good opening on 10/2 and 20/2 with signals to 5 x 9+, mainly JA8 and JA7. On 9/2 noted ZLs were working W6. FK8BG running 10 watts 0033Z to VK2QF and others on 7/2. Good Es to VK2 on 1/2, and to VK4 and VK6 on 3/2, 6/2, 7/2, 8/2, 11/2, and a few other since.

On 2 metres a number of good contacts to VK2 and VK3 from VK5CK. VK5RO and VK5ZDR heard working VK3 several times, finally signals decided to come into my QTH on 17/2 when I had contacts with Les VK3ZBJ and Roy VK3AOS, and heard VK3ZL, VK3BES and a couple of others but too weak to work. On 17/2 I tried 432 MHz to Roy VK3AOS as he was 5 x 9+ on 2 metres, but not a sign of a signal either way, not even a CW beat note! Very strange.

David VK5KK at Arthurton had his 52.150 off the air for a few days whilst antenna repairs were made. So now instead of 2 metre beams pointing at the ground he has a 16 element KLM type up about 70 feet and underneath an 8 element on 6 metres at about 60 feet. Test signals to me on 24/2 indicated the beams were working very well and 5 x 9 signals both ways on both bands resulted from about 2 watts over the 70 mile path. The 5 element beam on the VK5KK beacon will continue to point north-east as previously so you can be assured that its direction is reasonably permanent wherever you live.

TECHNICAL TOPIC

This month I would like to give you a brief outline of a 6 metre solid state linear submitted by **John VK4ZJB** and which should be of general interest. Details of circuitry, layout, parts, etc., can be obtained by sending a s.a.s.e. to J. D. Bisgrove VK4ZJB, 26 Kennedy Street, Brighton, Queensland 4017.

"The MRF 454 (flange mount) and MRF454A (stud mount) have been around for quite a while, initially classed as 'Amateur-CB Transistors'. 12.6V and 80W CW output, frequency 2 to 30 MH,z gain 12 dB.

"Even though tailored to 30 MHz I decided to try an MRF454. In a conventional single device circuit the results were as follows: A CW input of 1 watt gave a CW output of 3 watts; 2W gave 20W; 3W gave 35W; 4W gave 50W; 10W gave a minimum of 80W (saturation). Vcc 13.8V, readings taken with BIRD Thermaline. At 13.8V the device saturates at about 110W, the best operating point is when an increase in drive produces no further increase in output, then back off drive slightly. This form of amplifier should be useful to users of 2 to 4W PEP equipment, as well as an excellent mobile linear. Very worthwhile stable power gains are achievable in conventional-design amplifier figurations.

"It must be emphasised that you need to be liberal with your heatsinking on this device. Maximum dissipation is 180 watts, max. Ic = 15.0A. At all phase angles with Vcc 13.8V and 50 per cent overdrive, the device will not be damaged with adequate heatsinking . . . so there you are, give it a try!"

Closing with the thought for the month: "We often pardon those who bore us, but we cannot pardon those whom we bore."

73. The Voice in the Hills. ■

WICEN

R. G. HENDERSON,
Federal WICEN Co-ordinator.

The Department of Communications has recently issued a new brochure RB297 "Conditions Governing the Licensing and Operation of State and Territory Emergency Services Radiocommunications Service".

Whilst the title of this brochure suggests little connection with amateur radio, our continued WICEN liaison with the Natural Disasters Organization has ensured appropriate mention therein of amateur emergency networks. Some relevant extracts from RB297 follow:

Extracts from "RB297 Conditions Governing the Licensing and Operation of State and Territory Emergency Services Radiocommunication Services" Mov80.

PART 1 — INTRODUCTION

66 1. Licences in accordance with the provisions o fthe Wireless Telegraphy Act may be granted by the Department to State/Territory Emergency Services (SES/TES) for the establishment, maintenance and use of radiocommunication stations for training and operations in connection with their dual roles associated with disasters and civil defence activities.

1.1 Licences covering the radio activities of persons, volunteer groups, councils and government instrumentalities engaged in SES/TES operations shall be issued in the name of the SES/TES, which shall accept the full responsibility of the operation of the stations concerned.

1.2 Subject to approval by the Department, radiocommunications may be established between stations as indicated below:

(a) inter-communication between State Headquarters;

(b) State Headquarters and Regional Headquarters;

(c) Regional Headquarters and Local Headquarters;

(d) State, Regional and Local Headquarters and Local Mobile Units;

(e) inter-communication between Local Mobile Units; and

(f) combination of (a) to (e) to meet particular circumstances.

1.3 In approved cases, licences may be granted for the operation of low-powered personal mobile stations for communication over short distances with base or mobile stations. Paging receiving units may be licensed for participation in land mobile, radiocommunication services on the basis, generally, that the number of units does not exceed the number of land mobile stations in each service. In areas not served by a Telecom Australia paging service consideration will be given, where a need can be clearly demonstrated, for a greater number of paging units to be incorporated in a service.

1.4 It should be noted that public telecommunication facilities provided by Telecom, where available, shall be used for communication between fixed locations except in circumstances as indicated in section 3.9 and 3.17 of this brochure.

3.13 Emergency Amateur Station Networks — With the approval of an authorised officer of the Department and under prescribed conditions, the licensee of an amateur station may, as a member of an organisation of amateurs recognised by the Department, participate in special radiocommunication networks in time of civil emergency or disaster.

3.14 During a period of emergency, through a nominated co-ordinator and control station, may pass messages on behalf of the SES/TES. The log book of the control station shall have entered in it the name, rank and telephone number of the officer of the SES/TES who requested the communications assistance.

3.15 During the period of the emergency the licensee shall confine his transmissions to those necessary for the exchange of essential traffic. Casual conversation or necessary testing should be conducted on a frequency separate from that used for emergency communications. Correct procedure for the amateur service should be adhered to throughout the emergency working.

3.16 Exercises by SES/TES organisations to enable amateur operators to obtain practice in passing and recording messages may be permitted, following written application by the SES/TES and approval by the Superintendant, Regulatory and Licensing, in the State concerned.

FREQUENCY USEAGE

5.5 In view of the number of existing services already operating in the MF and HF bands, assignment of clear channels for use by SES/TES cannot be guaranteed. Therefore the possibility of the need to share frequencies with other users should be recognised.

5.6 Although certain frequencies have been reserved for use by SES/TES they may not be available for use at a particular location because of unacceptable interaction with existing services.

5.7 The frequencies 27.24 MHz and 27.26 MHz where assigned may be employed for both training and operational purposes.

5.8 The frequency 3733.5 kHz is a common frequency available to fixed stations and for this reason may be used as an emergency channel at times of failure of all other systems, including interstate operations.

5.9 Approval may be given for SES/TES stations to be operated on the frequency 119.1 MHz for communication with aircraft engaged in search and rescue activities on the understanding that the service is employed for the exchange of messages relating to the safety of life and property in an emergency. This frequency may be employed for training exercises involving communications with aircraft.

5.10 Use of the frequency 119.1 MHz, although authorised by a licence, shall be subject to co-ordination with the Department of Transport on each occasion it is required by the SES/TES.99

ACT WICEN EXERCISE, DEC. 1980

If you happened to hear some strange traffic on the Canberra Channel 6900 repeater one Saturday in December, it was more than likely you were listening to the annual WICEN communications exercise.

Twenty-three WICEN operators from the ACT Division participated in this year's exercise which, as in previous years, was held in support of the ACT junior tennis championships.

This year's exercise, however, was significantly different from those in the past. Besides the normal voice traffic from field operators to WICEN control — this year located inside the John James Hospital pathology laboratory computer centre — an RTTY link was used between the WICEN control centre and the tennis organisers at Lyneham.

The new features of the exercise were introduced so that problems experienced in previous years might be eliminated or controlled and to test coding and decoding of voice messages using a glass terminal and a mini computer.

The organisers, both from WICEN and

the tennis centre, agree that it was a most valuable exercise, very informative and of significant PR value. Briefly, the procedure was to encode field messages of tennis scores into a standard format by the WICEN operators before transmission to WICEN control. The coded messages greatly facilitated the speed with which messages could be handled. This year it was not necessary, as in past years, to have two VHF channels operating, as the one channel used was quite adequate to handle the volume of traffic.

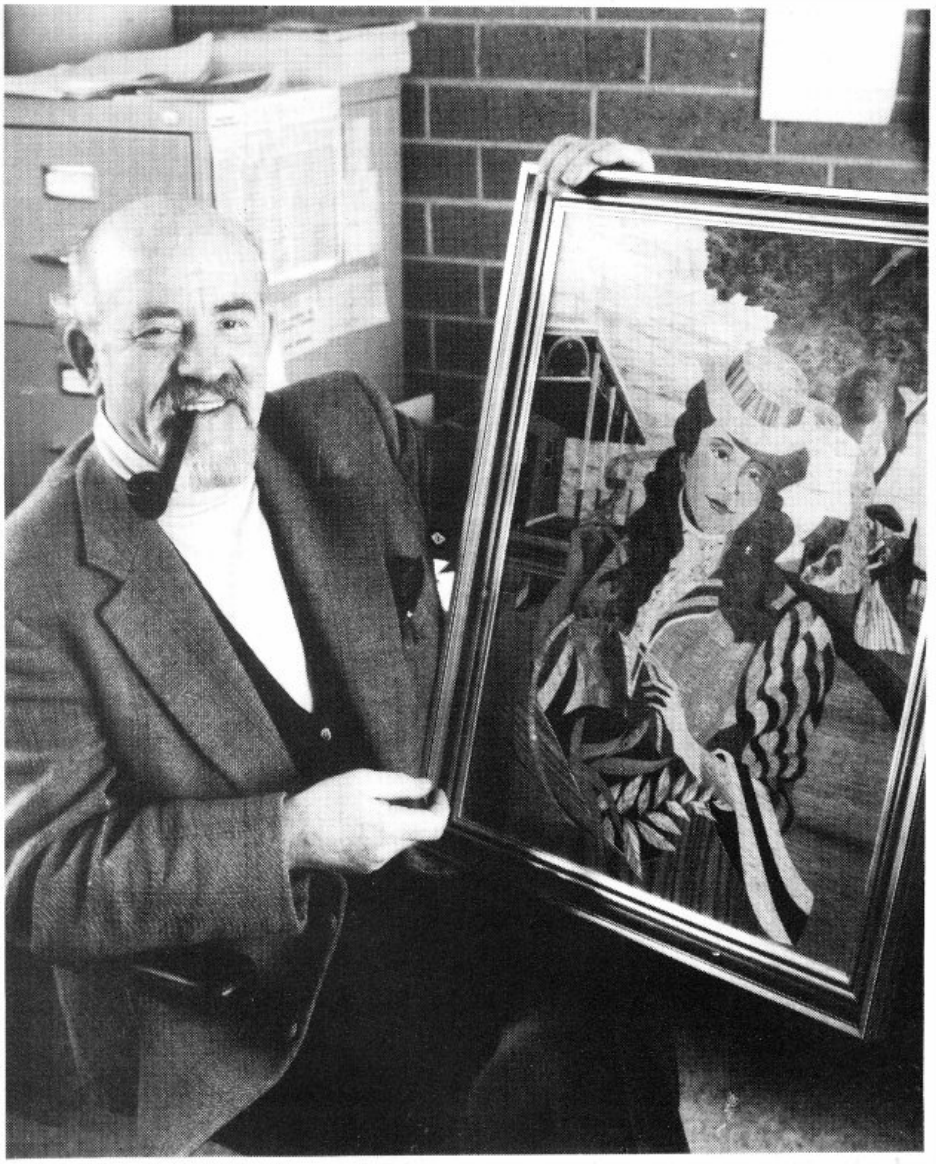
Once received the messages were typed into a computer terminal then decoded by the computer. This process occurred simultaneously with other voice messages being transmitted and received and there was no interference noticed between the two systems at any stage. The messages, once decoded by the computer were prepared for RTTY transmission and displayed in full before despatch. Once checked for acuracy the prepared message was transmitted on a UHF link to an RTTY terminal at Lyneham tennis centre some 12 km to the north. The messages were also displayed on a glass terminal, a refinement introduced in the field by the local operator.

In all 333 RTTY messages were passed — for those interested in ASCII code at 110 band — representing 40,000 characters sent during the whole exercise without a single character being garbled.

A further 178 administrative messages raised the total to 511 (considerably higher than in past years), in 540 minutes of on-air operations. The aims of the exercise were therefore achieved with considerable success. There were a number of problems encountered but these were quickly overcome in the co-operative spirit that prevailed among those participating.

The response from the members of the ACT Division to a request to participate can, however, only be described as fair, especially when one considers that this was the only exercise for 1980. ■

Close-Up



Mr. Henry Moritz VK3VMO. Henry is a lecturer at the Ballarat CAE and also Secretary of the Ballarat Amateur Radio Group. Henry judged the marquetry section at last year's Royal Melbourne Show. He is pictured with an example of his work, a picture made from inlaid wood. His work is represented in private collections and churches in USA, Europe and Japan.

From the Ballarat Courier

WIA

FEDERAL EMC CO-ORDINATION

- **Tony Tregale VK3QQ,** is the Co-ordinator
- Do you have any interference problems? (power-line, TVI, AFI, etc.)
- If so, send details to:

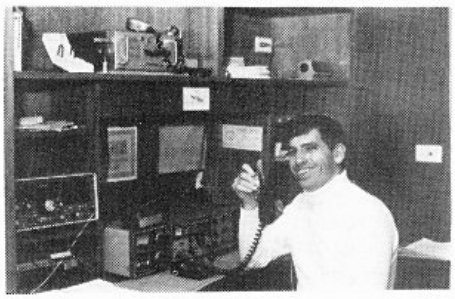
VK3QQ — QTHR

or via

WIA Executive Office, Box 150, Toorak 3142

SPOTLIGHT ON SWLing

Robin Hawood VK7RH
5 Helen St., Launceston, Tasmania 7250



I recently received my copy o fthe World Radio TV Handbook for 1981. It is the 35th edition with a print run of over 60,000. This is an authoritative directory of international radio and television and has the current details of practically all the broadcasting stations and outlets throughout the world. Not only is it useful to broadcasters and programme makers, but also to the listeners, be they casual or serious in attitude.

The countries are listed alphabetically within regional and geographical areas such as Europe, Africa, Near and Middle East, Asia and South-East Asia, Pacific, North America, Central America and the Caribbean and South America. It also is divided into separate sections for radio and television broadcasting.

It certainly has a wealth of information with frequencies, times of transmissions, languages used, and programme policies. There are also special articles on various facets of the broadcasting scene written from the viewpoint of the technical and administrative side as well as from the DX groups and individuals.

One article in particular — an Assessment of Broadcasting after WARC 1979 by Herr Willi Menzel — certainly merits reading. Herr Menzel was head of the Broadcasting Secretariat of the International Frequency Registration Board (IFRB) for 20 years and was an observer at WARC.

One conclusion from his article is that pressures for frequency space will increase despite the advantages of other forms of transmission such as satellites, cable and optical (laser). Many developing and emerging nations find that the utilization of HF communications is more economical than the use of the more advanced forms of technology. They also, in many instances, are in difficult economic circumstances, which precludes them from readily acquiring these sophisticated communications systems.

The biggest users of the HF spectrum over many years have been the Maritime Ship/Shore Stations. With other services pressing for more channels, there is pressure on them to relinquish some frequencies. It is interesting to note that in the past couple of weeks it has been announced that a satellite is scheduled to be launched early next year to carry the maritime communications traffic. It will be known as IMSAT. It is planned to have geostationary satellites over the three major oceans — Atlantic, Indian and Pacific. If more and more users do go over to utilizing IMSAT, it could relieve the congestion of some circuits, and their usage by other services. However, satellites have been known to fail going into orbit!

Another conclusion of Herr Menzel's article is that the release of the new allocations to various services such as the new amateur frequencies, will not be as swift as some would have hoped. It could be up to 1985 or beyond before the existing services are relocated.

This seems to confirm my own observations with particular reference to the proposed new frequencies for amateurs in the HF spectrum. Possibly the first one to be available would be 24.89 to 24.99 MHz. There appear to be few users occupying these frequencies at present. However, it is highly doubtful that the band 18.068 to 18.168 MHz will be cleared for many years. Many of the existing users such as the military, telecommunication, and aviation facilities will be reluctant to give up their frequencies. The 30 metre band (10.1 to 10.15 MHz) has been allocated to the amateur service on a secondary basis, and is heavily congested particularly in the evening hours, and I do not see that being open for some time.

Another factor will be how quickly the various administrations will clear these two new amateur exclusive allocations for utilization. Probably our own administra tion, the Department of Communications, will wait and see what the other administrations will do, and how quickly they will act.

I am looking forward to trying out the new frequencies when they do become available, for the propagation to be derived from them will be extremely interesting, especially the 30 metre allocation, which during the winter seasons should be open for DX communication practically 24 hours a day.

I have received a letter from **Mick Power VK4NGW** expressing interest in hearing about medium wave DXing and how to go about it, in this column. Anyone who has attempted DXing down on the medium waves certainly knows how frustrating and difficult it can be. Mick has only logged 3 to 4 American stations, 4 to 5 from Europe and a number from Japan. Well, Mick, you are certainly ahead of me, as the best I can claim are several Chinese megawatters, Korea, Japan and Bladivostock, also a Megawatter. With many Australasian stations now broadcasting for 24 hours it is very trying to say the least.

However, I have heard of one ardent MW "buff" who logged a station in Canada when they went to 50 kW and won a trip to Canada for being their most distant listener! I call that rewarding.

Mick would like to see a few articles on M/W antennas, loops, ATUs, etc., as there could be quite a number of people interested. So if there are any who feel that they could contribute in this field, could they contact me at the above address. Those who are interested in MW DXing could also contact either the Australian Radio DX Club or the Southern Cross DX Club, as they both have quite a good medium wave section in their respective publications.

Well, that is all for this month. 73s and the best of DXing! ■

YOU and DX

G. (Nick) Nichols VK6XI
6 Briar Place, Ferndale, WA 6155.

Oh boy, it's going to be one of those months, the shack floor resembles a garbage dump of ripped, torn and shredded notes, 10 metres is alive with DX (the sudden and slightly overdue upturn in conditions makes concentrating on anything other than the receiver a difficult task), however what is really causing me problems is knowing just how far I can go in recounting the story of what happened to *David N2KK* during his trip to the rarer Indian Ocean and Northern African nations.

No doubt many of you worked him, he operated from 4S7KK, 8Q7KK, J20CN, N2KK/ST2, and was able to fill for many elusive zone 24 on 10, 40 and 80 whilst at the latter mentioned location. However If you had followed David's trip as closely as I had, his non-appearance from ST0 had many of us wondering just what had gone wrong. Was he OK, was it equipment failure, what???? Rumours flooded the bands, however we will choose to ignore them, as fact in this instance was a lot stranger than fiction.

Firstly, in case you didn't know, there is no such thing as an amateur licence in South Sudan, you allocate your own call sign, decide what bands you'd like to activate and go for your life. Sounds easy? Well David arrived in Duba, booked into his hotel and promptly got his station on air. However being fairly tired he felt a good night's sleep was probably far more beneficial than a few hours of marginal propagation. At 3 a.m. he was awoken by the sound of his hotel room door being being forcibly opened, a somewhat rude awakening — to be confronted by a group of uniformed personnel armed with automatic weapons, placed under arrest and locked in his room — he was charged with spying!

Apparently the Head of Security had received an "anonymous" tip-off, the source of which is believed to have come from

another amateur. Apparently David had failed to realise the custom is to bridge and/or leave a donation of equipment — a mistake that could have proved fatal. Happily the authorities there listened to reason, withdrew the charges and returned the equipment. David, needless to say, did not hang around and is now safely back in the U.S. — what's all this got to do with DX? Well next time you work a DX-pedition from the comfort of your favourite chair, in a comfortable shack with a cup of steaming coffee or whatever close at hand, spare a thought for the op on the other end, his financial commitment, the hours of planning, the risks. Whilst the places may sound utopian the conditions seldom are.

FACT & FICTION

IRCs are causing problems redemption-wise in Liberia, green stamps should ensure prompt return of QSLs.

Don't totally write Kermadec off yet, rumours still abound, including one involving a well known VK, only time will tell.

4W didn't come off, the OE operator named as expedition leader denies all knowledge.

600DX cards are not being accepted by ARRL for DXCC status — despite authority to operate being obtained — perhaps he hasn't worked the "right" people yet.

VK4N1C/3X at time of writing was accepted for DXCC status and yet the Australia DXCC award authorities only accept if contacts are made in acknowledged NOVICE bands — that's plain stupid. He is licensed to *operate* in any band authorised by the Guinea government; as such any contact on any band for which authority has been granted is legal. This bias against novice operators by certain gentlemen is just going too far.

ON THE BANDS

10 Metres

Europe, North America, Africa and just a sprinkling of South American pounding in like locals — take advantage of the fine conditions while they last. On phone JT1KAI, FG0FOK, T30AC, W5JW/KX6, W5JMM/SU, OX1TW, FM7AV, OD5MR, A51PN, VK9NYG, A22ED, KV4AA, HV1AB, HV3SJ, HR1MZM, J73PP and EL2AK generated lots of interest, whilst on CW things were quiet — A4XIH being the only one of interest.

15 Metres

Overshadowed by the fine conditions on 10, most notable on phone FM7AV and VP8PP, whilst on CW FK8CE, KC6MW, VQ9NN and ZB2G were workable if you could break the pile-ups.

20 Metres

CW again was the mode to be concentrating on, A35EK, A5XHI, BV2A, CO7UPC, FH8CB, FM7AV, FG0FOK, FW0VU, VS5RP, VP9DR, ZF2AI and 5N0DOG, plus many more too numerous to list were very active during the month.

40 Metres

With the utmost respect the Japenese kill phone operations from here, piled six or seven deep and well over S9 the mode to us is undoubtely CW. FO0VU, KC6MW, VS6DO plus ZS and some Central Americans made this mode well worthwhile.

80 Metres

Hard work to find anything; on phone A4XIH and 7Z4AP found a patch of fine propagation, whilst on CW A4XIH, YU3ZH plus HS and JA were all workable. A4XIH will make scheds with VK on both modes but much prefers CW — he's on 10 most evenings.

Thanks go this month to Eric L3-0042 and Allen VK2AIR for their contributions.

QSL INFORMATION

EL2AK — via PO Box 1025, Monrovia, Liberia
HV3SJ — via I0DUD
FG0FOK — via YASME
600DX — via I2YAE (3 x IRC)
W5JMM/SU — via KA5AZT
T30AC — via WB6FBM
OD5MR — via HB9ABV
A35EK — via Fanga, PO Box 111, Nukualofa CI
A4XHI — Box 8530, Salala, Sultanate of Oman
FM7AV — via F6BFH
FO0VU, FW0VU, ZK1XG, 5W1DC — via DL2RM
KC6MW — via JR1AIB
ZF2AI — via W0CW

73s. ■

AWARDS COLUMN

Bill Verrall VK5WV
7 Lilac Avenue, Flinders Park, SA 5025

For this month I have included details of three awards which are available for working amateur stations in the Northern Territory (VK8).

The **"BOUGAINVILLE AWARD"** is sponsored by the Darwin Amateur Radio Club to coincide with the Darwin Bougainville Festival held in May each year.

The **"WORKED ALL VK8 AWARD"** and the **"WORKED DARWIN AWARD"** are made available by the Darwin DX Working Group, which is a separate body to the Darwin Amateur Radio Club, although most members of the Group are also DARC members. The basic aims of the Group are to promote the interest of overseas operators in the NT and to promote DX activity by means of achieving awards and competing in contests, as well as normal DX activity. The Group also assists approved charities in the NT with surplus funds raised by the issue of the two awards. The current project is to assist the NT Blind Association. As a long term project, the Group intends to compile information regarding the construction and/or modification of equipment to be used by blind operators. It is also hoped to devise training aids for those blind persons wishing to gain their amateur licence.

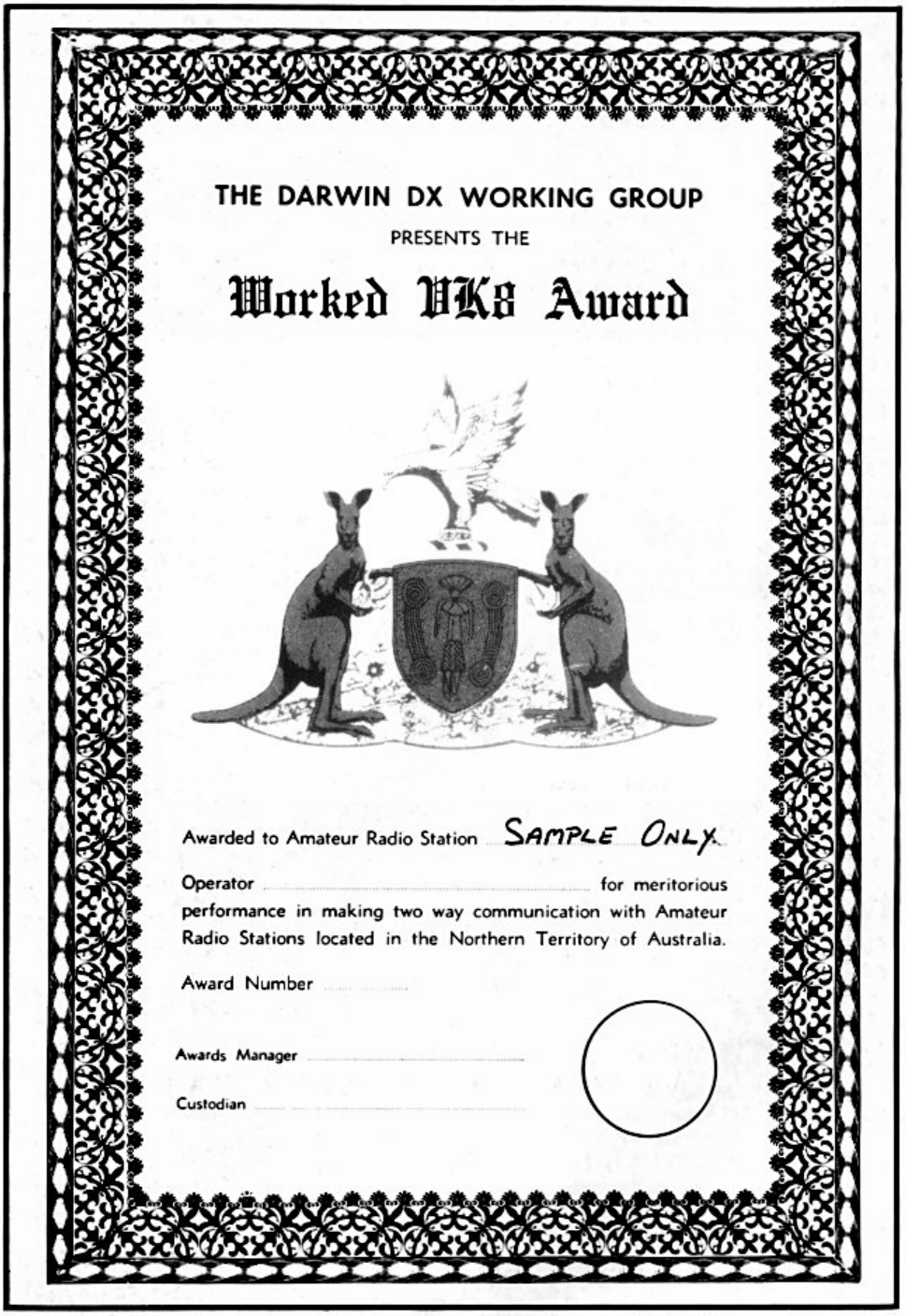
The rules for the awards are:—

BOUGAINVILLE AWARD
Work ten (10) different amateur radio stations in the greater Darwin area during the period from 0000Z 1st May to 2400Z on 31st May in the same year. Contacts made during previous years do not count. Contact with the Club station VK8DA counts as two (2) stations. SWLs hear ten (10) different stations in the greater Darwin area. The Club station VK8DA and the beacon VK8VF each count double. The ten differen stations can be worked/heard on any band, any mode.

Send a log extract signed by two other amateurs accompanied by a fee of $A1.00 or ten (10) IRCs to cover postage to the Awards Manager, Darwin Amateur Radio Club, PO Box 1418, Darwin, NT 5794.

WORKED DARWIN AWARD
Requirements:
DX stations require five (5) contacts with stations located in the greater Darwin area. VK stations require eight (8) contacts with stations located in the greater Darwin area.

WORKED VK8 AWARD
Requirements:
Irrespective of the applicant's geographic location, eight (8) contacts are required with stations located in the Northern Territory of Australia.



Any band, any mode, may be used, and SWLs are also eligible for both awards. The cost of each award is $A3.00 or 10 IRCs. A GCR certified copy of a log extract is required, i.e. the log extract shall be signed by the Federal Awards Manager, WIA, or any elected official of a WIA Division or affiliated Club, a JP or two other licensed amateurs.

Applications shall be forwarded to the Awards Custodian, C. Humfrey VK8NCT, PO Box 40318, Casuarina, NT 5792. Cheques, Money Orders or International Money Orders shall be made payable to "The Darwin DX Working Group".

DESCRIPTIONS
Bougainville Award:
Measures 235 mm x 200 mm, printed in two colours on thick white parchment type paper.

Worked Darwin Award:
Measures 295 mm x 210 mm, printed on high quality gloss paper with the surround and title in brown and remaining printing in black.

Worked VK8 Award:
Measures 220 mm x 320 mm — all other details as above.

Good hunting. ■

THE DARWIN DX WORKING GROUP

PRESENTS THE

Worked Darwin Award

Awarded to Amateur Radio Station ...SAMPLE ONLY.....

Operator ..... for meritorious performance in making two way communication with Amateur Radio Stations located in the City of Darwin.

Award No.....

.....No.....

Mode .....

Date .....

Awards Manager.....

Custodian.....

Correction to February AR: Address for Pioneer Shire Centenary Award is:
AWARDS MANAGER
MACKAY AMATEUR RADIO CLUB
Box 1065, Mackay 4740

Darwin Amateur Radio Club Inc. VK8DA~VK8VF

BOUGAINVILLEA FESTIVAL AWARD

Acknowledgement

AWARD Number ..... ISSUED TO VK5WV

for contacting/heard required number of Amateur Radio Stations in the Greater Darwin area during the Month of May 1980

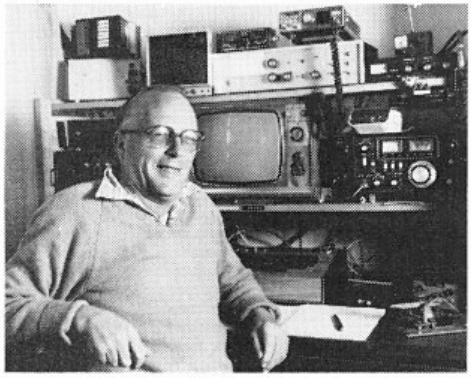
This Award is issued by the Darwin A.R.C. and the Darwin Bougainvillea Festival Committee.

Awards Manager

VK8HH

CONTESTS

Wally Watkins VK2DEW
Box 1065, Orange 2800



April		
4/5	Polish CW	FCM
18/19	Polish Phone	FCM
25/26	King of Spain Contest	AR 4/81
25/26	Helvetia Contest CW/Phone	AR 4/81
May		
10	"Corona" 10m RTTY	CQ 4/81
23/24	Europe and Africa RTTY	CQ 4/81
30/31	CQ WW WPX CW	CQ 2/81

KING OF SPAIN CONTEST

1. The trophy will be open to all nations, between Spanish stations and world stations calling Spanish EA stations, i.e. to be accepted QSO should operate with at least one EA station.
2. The competition will be held last complete weekend of April 1981.
3. TYPES: All types recognised by radio amateurs will be permitted.
4. FREQUENCIES: HF — 160, 80, 40, 20, 15, 10. VHF — 144, 432, 1.296.
5. SCORING: One point per QSO.
6. TIME TABLE: From 20.00 hrs. GMT Saturday to 20.00 hrs. GMT Sunday, with perodic rest of four consecutive hours.
7. QSOs: Only one QSO per station in each frequency and type will be accepted. 15 consecutive minutes should be worked on each band or type.
8. CONTROLS: The EA stations will give RS or RST and matriculations of the province. For example, a station in the province of Barcelona should submit 59B. Stations in other parts of the world should give the following information: RS or RST plus the contact number beginning with 001. The time should not be submitted, but should be entered in the lists in GMT.
9. FINAL SCORE: Number of QSOs multiplied by the number of provinces obtained for band, taking into account that stations in Calella count as extra multipliers.
10. CALL SIGN: "CQ Calella — III Trofeo SM el Rey de Espana" to call stations in Calella, and the general call sign of the contest will be "CQ III Trofeo SM el Rey de Espana".
11. LISTS: Should be submitted to "Agrupacio Radioaficionats Calella. Apartado 181. CALELLA (Barcelona) Espana. Closing date: postmark 10th June, 1981, 2 IRC or $1.
12. The station which obtains a total of 75 QSOs will receive the commemorative award. Special QSL to all received logs under 75 QSOs.
13. The SWL stations which wish to participate will receive the commemorative Diploma by obtaining 150 QSOs.

TROPHIES:

— Trophy H.M. The King of Spain for the first place, international and national.

— Trophies for the second and third places, national and international.

— Trophies awarded to the highest classification, national and international.

— Special prize for the highest classification, national and international, with an invitation for the winner and one companion to spend eight days in Calella in the second fortnight of August 1981 to receive the trophy.

— Trophies 1er classification SWL — national and international (HF).

— Trophies 1er classification SWL — national VHF.

Calella-Cost del Maresme, August 1980.

HELVETIA CONTEST

Each year, last full weekend in April.
1981: April 25th to 26th, 1500-1500 UTC.

Use bands between 160 and 10 metres.

Mode CW or Phone.

Send RS(T) plus a three-figure serial starting with 001. Swiss stations will send an additional two-letter designation of their canton. Example: 57(9) 001 BL. The abbreviations of the cantons are as follow: ZH BE LU UR SZ OW NW GL ZG FR SO BS BLU SH AR AI SG GR AG TG TI VD VS NE GE JU.

Each contact with a HB-station counts 3 points.

A station can be worked once per band (either CW or Phone). The multiplier is the sum of Swiss cantons per band (a possible multiplier of 26 per band). Final score will be the sum of QSO points multiplied by the sum of cantons. Awards will be given to the highest entry from each country. USA and Canada call areas are considered as separate countries.

Logs postmarked not later than 30 days after contest should be sent to:

TM USKA K. Bindschedler, HB9MX, Strahleggweg 28 8400 Winterthur, Switzerland.

For the new attractive award only contacts made after January 1st, 1979, have validity.

Mail your list and the confirmations for each of the 26 cantons worked on CW and/or Phone, RTTY or SSTV to Award Manager: Walter Blattner, HB9ALF, PO Box 450, Locarno 6601, Switzerland.

Results of the 1980-81 Ross Hull Contest:

Outright winner is VK6KZ with 45750 points.

Individual scores (* denotes a certificate winner):

	48 HOUR	7 DAY
VK6KZ	208070	45750*
VK3YII	8984	29244*
VK6HK	9220*	25000
VK3YNB		10399
VK3AUI	26828	8812
VK6OX	2800	7840
VK4DO	2324	7812*
VK3XQ	2962*	7490
VK2QF	3060	5498*
VK1ZAR	1356	4129*
VK2YHU	1402*	3711
VK4GM	890	2928
VK4PZ	1248*	2832
VK7ZLB	838	2633*
VK4ZTV	730	2198
VK3YRP	496	2018
VK7KJ	712*	1966
VK3AOS		1489
VK2YEP	554	1242
VK8GF	1020	1160*
VK2HZ	373	1071
VK2BVO	520	808
VK4LX	750	
CW		
VK2DEW	22*	
OVERSEAS		
ZL2CD	4100	7500*
ZL2BGJ	2800*	4900
JA2TTO	250*	

Logs submitted this year are double those of last year. The band multiplier certainly helped the winner, five bands each day, as did an excellent opening on 52 MHz to JA where many prefixes were worked. Gone are the days of sitting back in a superb location with plenty of time to win this contest.

A letter to hand from Harold VK4DO and others. They raise some points (anomalies) regarding this contest.

1. Five weeks is too long. Three weeks at Christmas would do.

2. Abolish serial number; this gives the opponent a clue as to how you are doing.
3. Abolish the multiplier rule as this puts the country amateur at a disadvantage.
4. Start a YL section.
5. If rule amendments are not made then the chap in the country cannot compete with the big city fellows on present conditions.

COMMENTS:

1. Five weeks allows for those who have staggered holidays at Christmas, if any at all. It must be remembered that only 7 days count for the final score, be it 7 in 21 or 7 in 35.
2. Giving a serial number shows that the other fellow is "in" the contest. Perhaps the Romanian way may be better. If the other fellow does not put in a log your contact with him does not count.
3. This is a memorial contest and the contest should honour the man and we should also remember his endeavours in the VHF/UHF field, and so encourage others to follow suit. Ross Hull was an experimenter on many bands and the multiplier is used to encourage this. If a "country" amateur has an amateur neighbour within 100 km, and not many haven't, then with a bit of building and effort, like Ross Hull, he could get further multipliers in the contest.
4. A "YL" section? The CW section is not used — look at this year's results.

A note from one of the logs sums up the general feeling from comments this year — "Do not tamper with the new rules too soon, but give them at least a two year run to see if activity improves." ■

The following may be of interest to you. Last year the VHF and TV Group revived the "State of the Art Contest" at the suggestion of the Secretary, Mike Farrell VK2AM.

The object of the contest was to promote the use of State of the Art equipment to communicate in the amateur bands above 52 MHz, and to promote activity in these bands in general. To do this, points scoring favoured the "harder" areas (microwaves, etc.) and "easy" modes were disallowed (e.g. sporadic E on 6m).

The contest was held from 19th July, 1980, to 31st August, 1980. The frequencies in use were all amateur bands above and including the 52 MHz band and net frequencies.

Here are the results:—

Call Sign	*Points Claimed*	*Points Allowed*
VK2ZQC	1200	1200
VK2ZYM	3050	3050
VK2BYY	3050	3050
VK4ZRQ	8386	8386
VK2YHS	10230	11730
(Now VK2ZAB)	+ maybe 1500	

■

NOVICE NOTES

Edited by Ron Cook VK3AFW

Each leg = λ/4 at 3.5 MHz.
5 λ/4 at 21 MHz.
7 λ/4 at 28 MHz.

All shorting wires on antenna: Set 3.5 MHz operation. Clip-on centre insulation removed: 28 MHz operation. Clip-on insulator closest to feed point only: 21 MHz operation.

The insulators should be connected into the legs with about 30 cm of wire left hanging for tuning and then clipping to the other side of the insulator for other band operation with aligator clips.

21 MHz must be tuned first then 28 MHz, and last of all 3.5 MHz.

The feed point of rig antenna is only at 6m, and the ends at each leg can be reached easily from the ground.

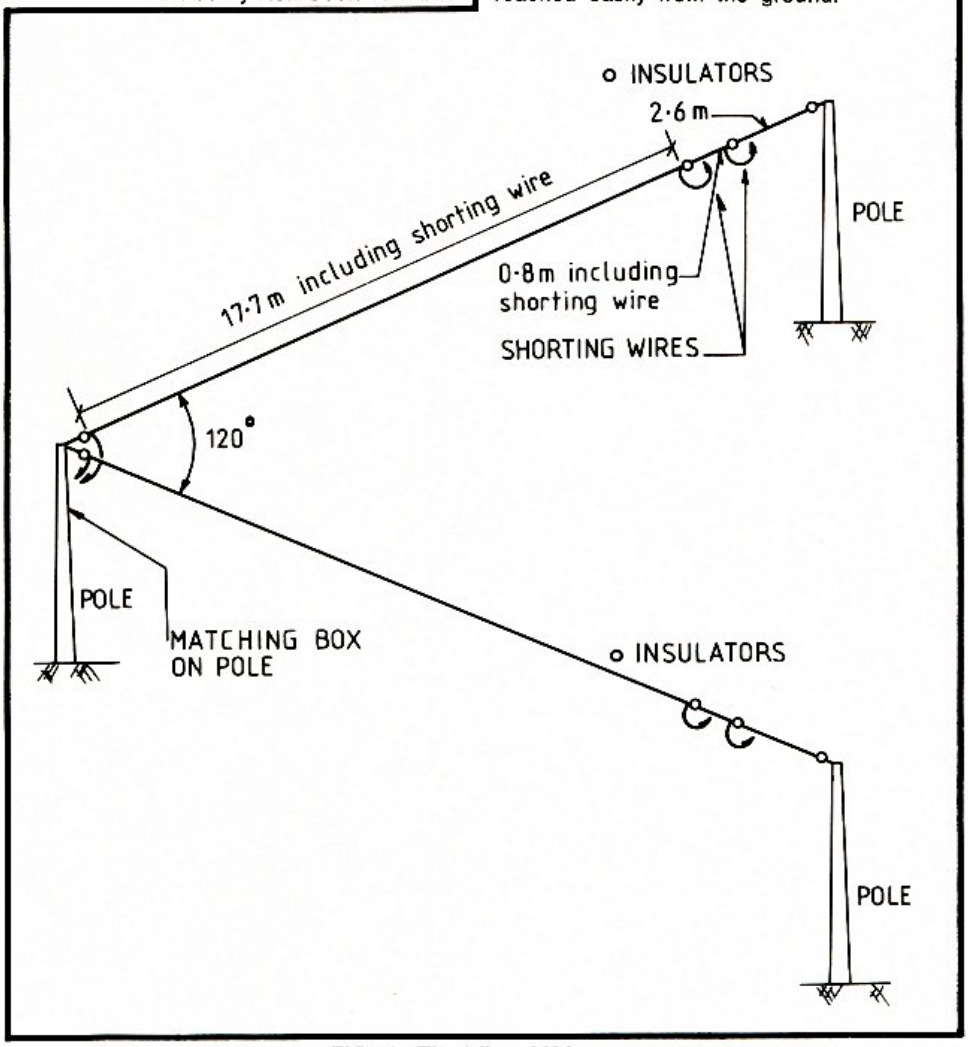


FIG. 1: The triband V-beam.

Here is an interesting antenna from David VK3NOB/VK3XBC.

A WIRE BEAM FOR NOVICE OPERATION

The antenna described here was used because of my need for a cheap antenna with a reasonable gain and did not require much room (small backyard) and yet gave multi-band operation.

The "V" beam configuration was settled on, so after construction tuning was commenced. It was found that the antenna feed point impedance of 21 and 28 MHz was

about 200 ohm and at 3.5 MHz about 45 ohm. I determined this with the use of an RF impedance bridge, see Fig. 3.

I used a 4 : 1 and a 1 : 1 balun with a chanegover relay "4 PDT". See Fig. 2. The antenna has been used with good results on all three novice bands and compares fairly well against a 10m mono-band Yagi.

VSWR is pretty low across all bands and I keep regular skeds on 15m with VK0DB, and reports are pretty close to those received by another novice located about 2 km south of my QTH, who uses a 4 element duo-band Yagi.

With careful thought on aiming the beam, maximum use of its bi-directional radiation pattern can be utilized.

Thank you very much, David.

Let's hear more from you, the reader. ■

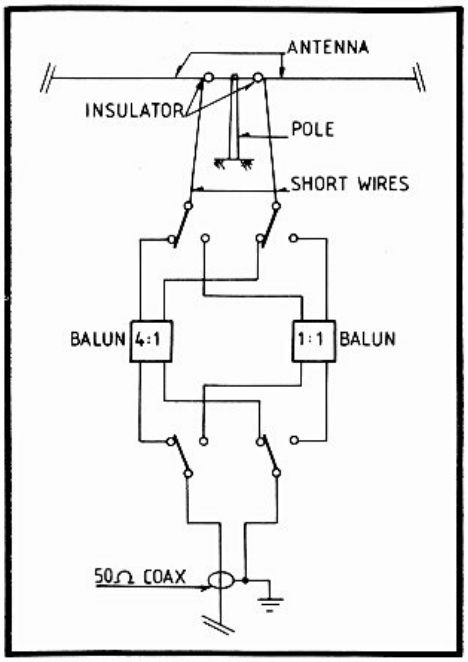


FIG. 2: Matching box house in a plastic waterproof box.

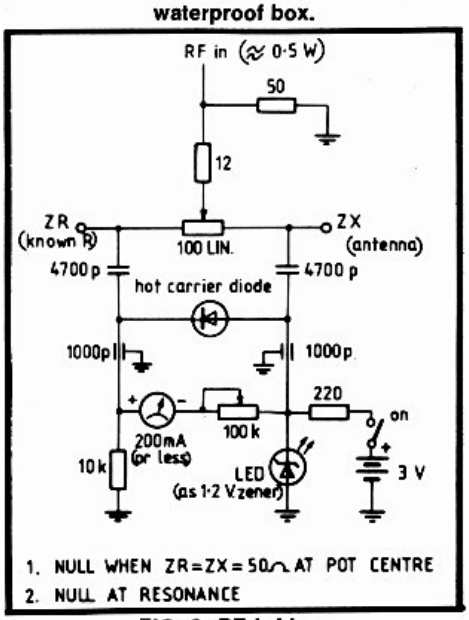


FIG. 3: RF bridge.

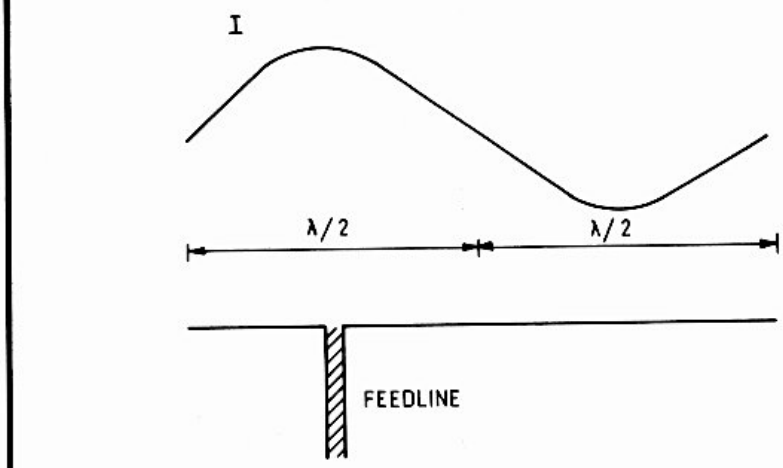


FIG. 1. FULL-WAVE DIPOLE, OFFSET FEED

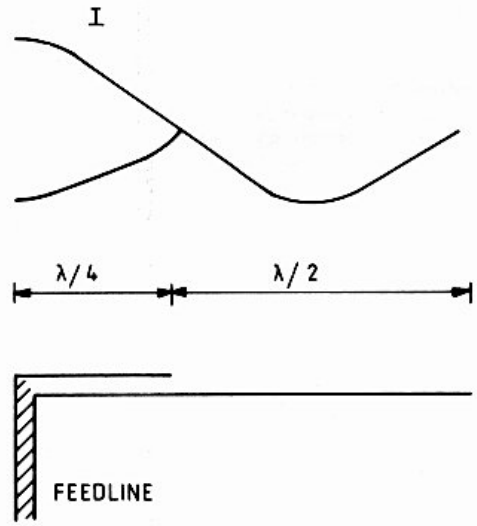


FIG. 2. END-FED DIPOLE, QUARTER-WAVE MATCHING SECTION IN LINE WITH RADIATOR

A ROSE BY ANY OTHER NAME

One antenna that is enjoying a high degree of popularity in Melbourne, at least amongst the 2m FM fraternity, is the "Slim Vim". This is none other than the End Fed Zepp in thin disguise.

Sixty years or so ago Count Von Zeppilin was amazing the world with scheduled passenger carrying Zeppilin flights from Germany to South America. These gas filled dirigibles were in the air for about a week and, although twice as fast as a steamship, communication with the landing fields, booking office, etc., was essential. Radio was the obvious answer, although it was not as well developed as was desirable.

The antennae in use at that time used large efficient ground systems and so were not suitable for airships. A new type of balanced (or nearly so) antenna was devised, suitable for trailing from the airship. This came to be called the End Fed Zepp and was widely used by amateurs before WW 2. After hiding away for 30 years it has re-appeared.

Although it is essentially a single-band antenna it is easy to build and so is of interest to the novice. No high efficiency ground system is required and a single pole at the centre or end is sufficient for its support.

First let us consider the theory and evolution of the Zepp. In Fig. 1 we have a centre fed half-wave dipole to which has been added another half-wave at one end. The feedline is connected at a current maximum. The feed resistance may be around 100 ohms which would give a VSWR less than 1.3 : 1 for a 75 ohm line. Although the feed is not symmetrically placed the unbalance in feedline current is acceptable.

Now suppose that the left-hand end of this dipole is folded over as in Fig. 2. We now have almost the same situation but we recognise that the radiator is now only a half wavelength long. It is now end fed through a quarter wavelength section of transmission line, which has very nearly equal currents in each leg and so does very little radiating. This transmission line will have a characteristic impedance Zo. If the feedline has an impedance Zf, then the combination will match the impedance of the antenna Za when

$$Za = (Zo)^2/Zf.$$

If Zf = 50 ohms and Zo = 300 ohms, then Za = 300 × 300/50
= 1,800 ohms.

This is the order of resistance we expect at the end of a resonant half-wave dipole. If the dipole is resonant, altering the spacing between the two wires will alter Zo and so allow a good match to be obtained for the feedline.

Fig. 3 shows various alternative arrangements for the Zepp. In Fig. 3a the quarter-wave section hangs down from the antenna, which is supported on insulators at A and B. This reduces the distance between supports. If only one support is available then the Zepp may be hung from the far end at B as in Fig. 3c, or it may be elected in the centre, C, and the ends may be as low as F, 2m, as in Fig. 3d. There is tnother possibility for 10m operation and that is a vertical arrangement as in Fig. 3d. In all cases the feedline is connected at X.

Another name for the vertical End Fed Zepp of Fig. 3d is the "J-pole".

Any dipole may be "folded", that is given an extra one or more wires to increase the feed resistance as is done for a folded dipole. The Zepp may be folded as well. Fig. 4 shows a Zepp of this form. It could be made of 300 ohm ribbon and Fig. 5 gives suggested dimensions for use on 10m.

A modification to the feed system is necessary if 300 ohm ribbon is used in construction. The end of the ribbon is shorted and a feed point for lowest VSWR located by using two pins to push through the insulation and temporarily connect to the feedline.

The dimensions a, b, in Fig. 5 may be scaled for other frequencies. On 28.5 MHz the feed point will be about 240 mm from the bottom.

The Zepp is similar to another antenna, the Ringo. The Ringo is an end-fed half-wave but it uses a tuned circuit for matching instead of a transmission line.

The 300 ohm Zepp rolls up for easy transport. It may be hung inside a PVC tube and sealed against the weather. The assembly may be clamped to a mast. Keep the top section with the antenna and matching section away from other metal objects. Do not use grey PVC tubing as this reputably has high RF losses.

So why not try zapping the DX with a Zepp? ■

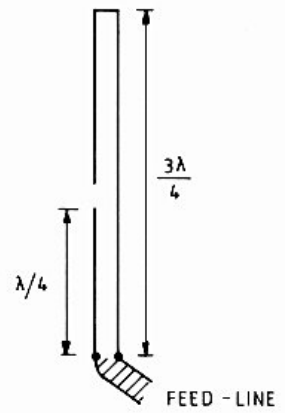


FIG. 4. FOLDED ZEPP OR SLIM JIM

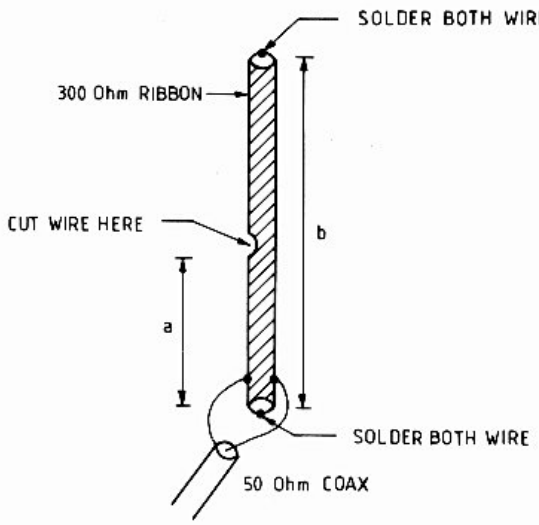


FIG. 5. ZEPP MADE FROM 300 Ohm RIBBON FOR 28·5 MHz
a = 2·05 m
b = 6·15

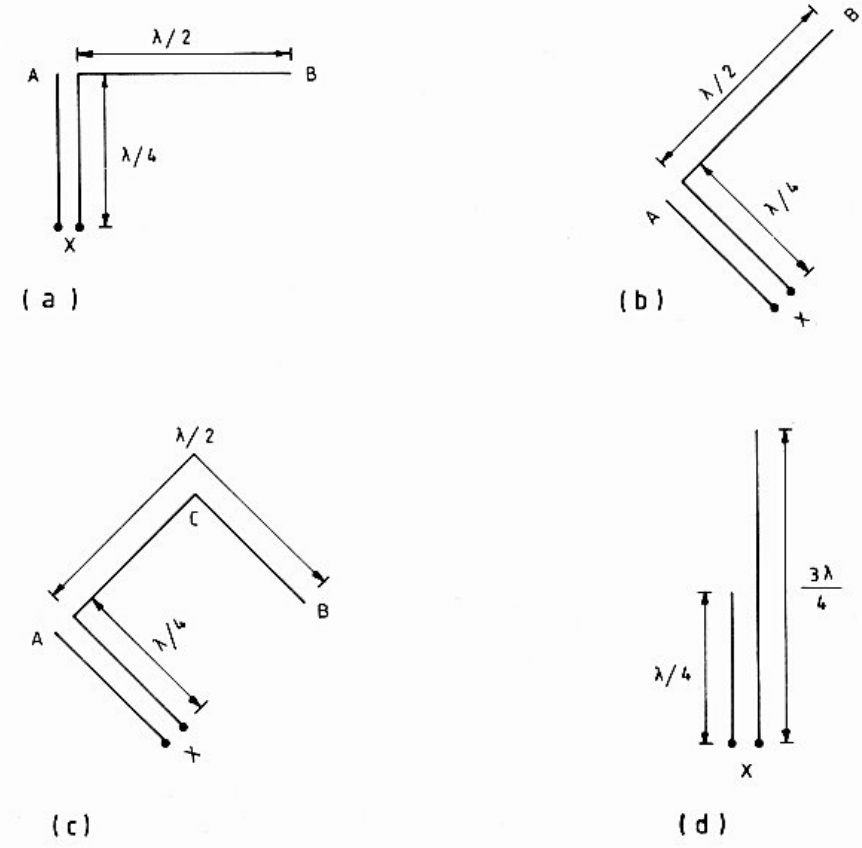


FIG. 3. ALTERNATIVE PHYSICAL ARRANGEMENTS FOR END FED ZEPPS SUPPORT AT A,B,C FEED AT X.

Victorian Midland Zone Convention

STRATHFIELDSAYE HALL
(15 km East of Bendigo)

Murray VK3DOV No. 2

In very fine and sunny conditions the Annual Convention of the Midland Zone was held at the Strathfieldsaye Hall on Sunday, 22nd February. Four excellent suppliers exhibited their wares and amateurs and their wives from all parts of Victoria, and including one couple from VK2, enjoyed the barbecue lunch prepared by the ever willing wives of those in the Bendigo and Harcourt areas of the Zone. Very little interest was shown in the hidden 2m transmitter and the fox hunts did not get the attention the prizes deserved. The hammer throw and nail driving contest for the wives of those attending drew an excellent entry, their aim was straight, they drove a mean straight nail in spite of being harassed by their OMs.

As a Zone we sincerely thank those distributors who attended:

Bail Electronics, Dick Smith, Eastern Communications and George Sumner.

A convention without gear on display is akin to a witch without her broom. Pre-loved gear is mostly in the hands of the original lover.

Howard Rider and his mate gave some pointers on ATV and the afternoon tea, which was consumed by those who paid their way and those who failed to meet the cost, was followed by some very pertinent words from Alan Noble, President of Victorian Division, WIA.

The organisers who spent more than 12 hours at the hall, vowed and declared that they will do the same job next year, the good fellowship is worth the hard work involved. ■

Stan Roberts VK3BSR and his wife.

George VK3ZZI filling a vacancy at noon and talking with Kay the XYL of Doug. VK3VQT, our President.

Murray VK3AMP No. 1.

If you have a Convention you need the support of your distributors.

Fred VK3ZZN (centre), Keith VK3ACE and onlooker.

INTERNATIONAL NEWS

WEST GERMAN LICENSING

Advice from DARC states that amendments to the West German legislation concerning amateur radio came into effect 1/6/1980. Three classes of amateur licence are provided for and power limits are now based on RF output power. Licence fees are stated to be DM3 per month. The class B licence appears to be similar to our full call but 750W peak output is permitted except on 160m and all bands above 23 cm for which 75W is permitted — the code test is 12 w.p.m.; call signs are in the prefix series DF, DJ, DK and DL. The class C licence is similar to our limited licence but applies on 2 m and above and peak RF output power is 75W maximum; call signs are in the prefix series DB, DC, DD and DG. The class A licence allows 150W peak RF, output power is 150W for telegraphy (CW, RTTY) modes in the bands 3.52-3.6, 21.09-21.15 MHz and 28 MHz bands and up (but 75W peak powers on bands above 23 cm); morse code test is 6 w.p.m.; call sign prefix series is DH.

Other amateur prefix series in West Germany include DA for military stations and various prefixes for reciprocal licensees and club stations.

A reciprocal agreement with West Germany is currently under negotation.

* * *

SPANISH LICENSING

According to IARU R1 News 3 classes of amateur licence are in force in Spain. Class A for max. 250W on bands 3.5-3.55, 3.75-3.8, 7.0-7.2, 7.03-7.1, 14-14.35, 21.15-21.45, 28.2-29.7 MHz, class B for max. 50W on 2 metres and up and class C for 20W max. power for 3.55-3.575, 7.02-7.03, 21-21.15 and FM 29-29.1 MHz.

* * *

JAPAN, ETC.

Work is continuing on negotiating a reciprocal agreement with Japan. Negotiations have opened with Denmark for a reciprocal agreement.

* * *

THIRD PARTY APPROVAL — CANADA

A letter received from the Department of Communications is included in WIANEWS in this issue.

THE WOODPECKERS

In a circular of 27th January, 1981, the Secretary of IARU writes that a prominent administration wishes once again to address the problem of the so-called Russian Woodpecker, which is reported to be an over-the-horizon radar system and which causes extreme interference to a number of important radio services, including the amateur radio service.

The IARU regards it is as important to the future of amateur radio that as many amateurs as possible file as many reports as possible of interference to the amateur radio service from the Russian Woodpeckers. All such reports should be channelled through the WIA Intruder Watch Co-ordinators so that complaints can be filed with our own administration.

The circular from the IARU draws attention to the fact that the proper avenue of complaint about this interference is through the telecommunications administration of the stations which suffer harmful interference. In the world of the ITU it is these administrations which wield the power. In a problem such as this effective action can result only when a number of administrations can be vocal enough in their concern. ■

AMATEUR SATELLITES

C. J. Robinson VK3ACR

By courtesy of the AMSAT Bulletin a number of interesting items of news have been noted. These are:—

Oscar 7 has had a tendency to drop out of its schedule, the transponder dropping into Mode B, but in general the quality is OK in both A and B Mode.

The only schedule change is that on Thursdays Oscar 7 will be in Mode D (Mode B with reduced power). However, it will be difficult to notice any change in operation in this condition.

Because Oscar 8 is having battery and base heating to some degree, this satellite until further notice will be operating in both modes (A and J) each day; this will be changed from time to time. It has been recorded that the batteries and base plate have reached temperatures near 44°C, which is very close to maximum allowable.

This is due to the near continuous sunlight being somewhat warmer than it has been in previous seasons. As this temperature condition subsides it will be found that Oscar 8 will return to normal.

The following are estimated probable launch dates of satellites:

LO3 — June 1981.

LO4 — October 1981.

LO5 — December 1981.

LO6 — February 1982.

LO7 — April 1982 (Phase IIIB).

AMSAT reports that they are looking into the possibility of a new kick motor, in which they can use liquid fuel; this will allow greater control, such as stop and start, etc.

It is also reported that the Firewheel Project has been scrapped owing to the high costs.

A proposal has been made to incorporate a Mode L transponder in Phase IIIB, this having an uplink on 1296.15 to 1296.95 MHz and the downlink 436.15 to 436.95 MHz.

Congratulations to **John VK4TL** on his epoch making Oscar 7B two-way contact with the USSR, namely RA0LFI. I am sure that this would be a VK DX satellite record. ■

The Intruder Watch

It is pleasing to see the broadcast station radio of the Koran from Riyadh in Saudi Arabia has now QSYd from 21435 MHz. This follows from letters sent direct to the station and complaints to the DOC.

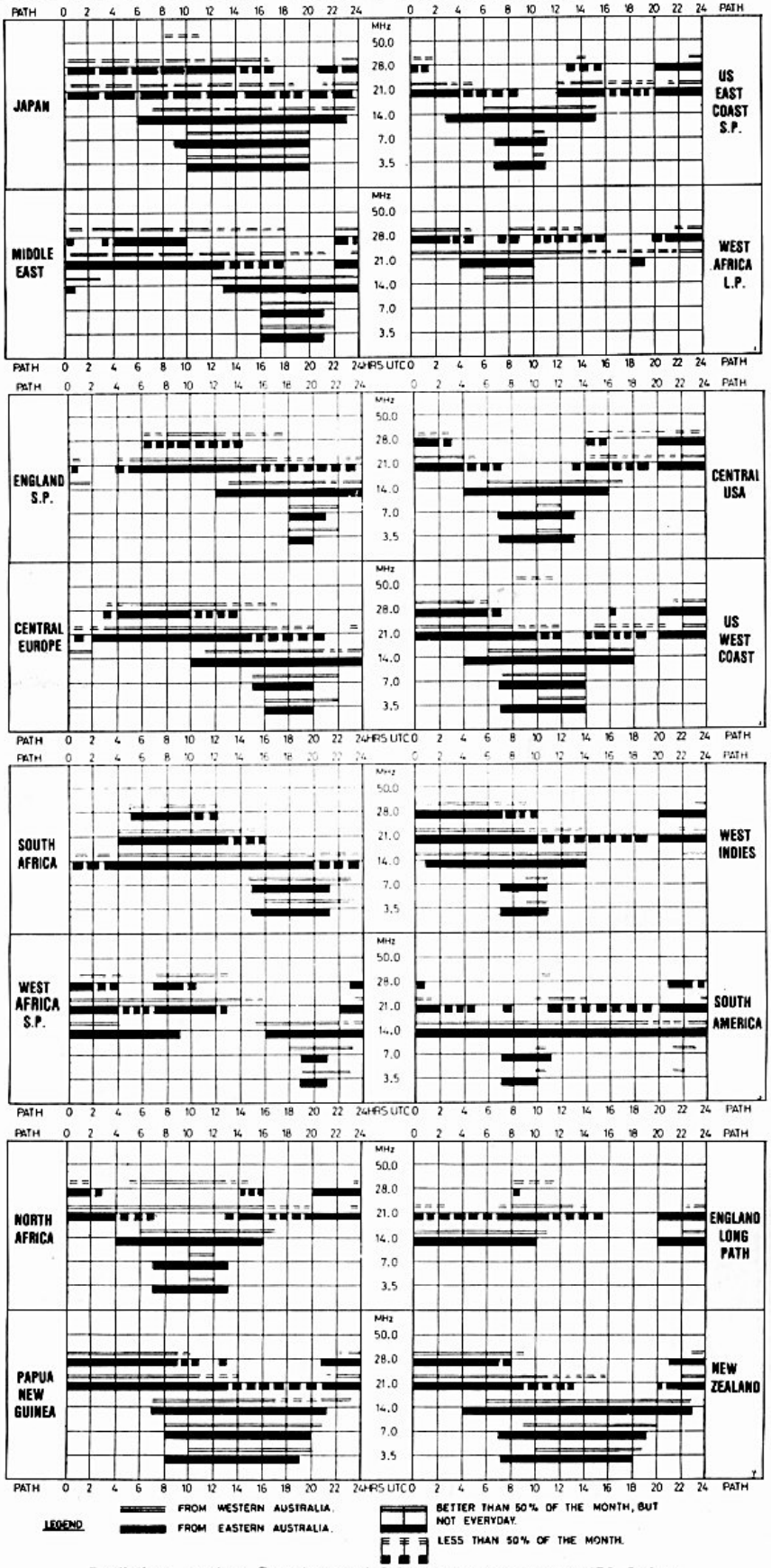
Amateurs are specially requested to send in as many reports as possible about the interference caused by the Russian "woodpecker" on our bands. Send these reports, with details of frequency, date, time, etc., direct to your Divisional IW Co-ordinator or to me. This problem is being tackled on a world-wide scale as it is a matter of importance to the future of amateur radio itself.

Don't forget the Intruder Watch Net on Thursday nights at 0930Z on 3540± QRM. ■

From the Propagator, Feb. 1981

IONOSPHERIC PREDICTIONS

Len Poynter VK3BYE



Predictions courtesy Department of Science and Environment IPS Sydney.
All times universal UTC (GMT).

SILENT KEYS

It is with deep regret that we record the passing of —

Mr. B. J. FAYLE	VK3IW
Mr. ERN COOK	ex VK3EC
Mr. A. H. B. BRODRICK	VK2HI
Mr. W. A. JONES	VK5NJA
Mr. C. K. STENFIELD	VK3CK
Mr. A. McCULLAGH	VK2RR
Major M. E. COLLETT	VK2RU

OBITUARIES

ERN COOK ex VK3EC

It is with deep regret that the death is announced of Ern Cook ex VK3EC on 17th February, 1981, aged 78 years.

Ern held the call 3EC before 1923, when he lived in the Swan Hill area.

During the war he served with the RAAF in an aircraft construction unit in the Northern Territory. After the war he moved to Melbourne and worked in the Radio Construction Section of the PMG Department.

All his life he was extremely active in Amateur Radio, being one of the early occupiers of the 144 MHz band on AM and also very active on 7 MHz.

After several severe strokes Ern was forced to give up his licence about five years ago and for the last year was confined to a private hospital.

He leaves a wife Hilda, and deepest sympathy is extended to her from all radio amateurs.

Allen Crowther VK3SM. ■

BERNARD JOHN FAYLE VK3IW

Bern Fayle passed away on 22/1/81, after a short illness. He was licensed in the late 1930s and for many years operated home-brew gear with a zepp aerial from his Burnley QTH. Many Old Timers will remember him as a good CW operator. Later he lived at Nunawading, a move which coincided with the purchase of a sideband transceiver.

Bernie had a wide range of interests and activities. During the war years astronomy was substituted for radio and he built his telescope, grinding and polishing the lens and mirror himself. He was a keen fly fisherman, bushwalker and photographer and his expeditions in pursuit of the elusive trout took him to many remote parts. There are not many likely streams in Victoria that he had not visited at one time or another.

His greatest love was the Australian bush and the outback. In more recent years his annual escape from Melbourne's winter took him by four-wheel drive vehicle, equipped with fishing gear, refrigerator and Atlas transceiver to warmer parts "up north".

Those of us who knew him well will remember him for his cheerful and outgoing nature, his fund of stories and his interest in people. He will be greatly missed. To his sister, Una, we extend our sympathy.

ALAN COOK VK3AUC. ■

LETTERS TO THE EDITOR

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publisher.

Bellbird Private Hospital, South Blackburn
23/12/80

The Editor,
Dear Sir,
As an old member of the WIA I allowed my membership to lapse a few years back. This was an error of judgement which I freely acknowledge. I have repaired this by rejoining some months ago.

Am in this hospital with a somewhat uncertain future but am thinking positively. I may add that I am most impressed with the standard of AR and it hurts a little bit that it is not on the news stands, particularly in view of the lamentable rubbish which is there in the guise of "CB".

I have a Wadley loop type of receiver beside me and derive much pleasure from it.

Unfortunately hospital QRM and TV sets make it hard going on the short waves. But not to worry. I get a lot of pleasure from the ABC programmes.

A development on the ham bands in which I think we have slipped back is in the lack of "Catch as catch can" QSOs. This is largely the result of the "Net" nature of SSB.

I heard a couple of blokes meet for the first time the other morning after a CQ call and the resulting QSO was a beauty.

It's natural enough, particularly for we "oldies" that we should want regular contacts with our old cobbers. But the result is frequently a lively band occupied by a few nets.

So what about a "CQ a day" campaign, fellers, including the novice frequencies.

Bern. J. Fayle VK3IW. ■
(Now Silent Key. See obituary)

144 Newnham Road,
Mt. Gravatt 4122, Brisbane

The Editor,
Dear Sir,
I have broken away from my AOCP studies for a few minutes to put forward an idea.

In recent issues of "Letters to the Editor" I have read of the controversy surrounding the Multi Choice paper and the reasons for and against.

Regardless of the method of examination, my problem is in understanding the theory itself. Not being involved with electronics in any way in my everyday employment I, like many others, have to tackle the job when I can find the time. As I am unable to attend a AOCP night class, it's a matter of burying your head in a textbook and try to unravel what the author is trying to say. Which brings me to my idea, that being the possibility of someone, group or the WIA, producing a set of cassette tapes to coincide with the AOCP syllabus and textbooks, e.g., "Orr Radio H/Book or ARRL H/Book", etc. It could be done by a system of a cassette per chapter, for example, thereby allowing a person to stop and start the cassette at any point to fully understand what is being read or said. Also it could be studied at the person's own leisure, as I enjoy our hobby very much, I believe many current novice operators trying for the AOCP could more fully understand the theory in the time available to him. I would be interested in any comment on the feasibility of this idea.

73s. Mick Power VK4NGW. ■

7 Dallas Avenue, Oakleigh 3160
28/1/81

The Editor,
Dear Sir,

RE STANDARDS

On page 51 of December AR John VK2BTQ gives some definitions for standards of measurement. Although it does not detract from the thrust of his argument the definitions of the ampere and the ohm are incorrect. They were correct many many years ago and, just to set the record right, I draw your attention to the current definitions.

The ampere is defined as the unvarying current that, when flowing in each of two straight parallel conductors of infinite length and negligible cross section separated by a distance of one metre from each other, produces between those conductors a force of 0.0000002 Newton per metre length of conductor.

The ohm is defined as that resistance that produces a potential drop of one volt when one ampere flows through it. This is a shortened and simplified definition.

In the S.I. system (commonly called the metric system), under which we now operate, all units of measurement are derived from seven base units, the kilogram, metre, second, ampere, kilom, candela and the mole, plus two supplementary units, the radian and the steradian.

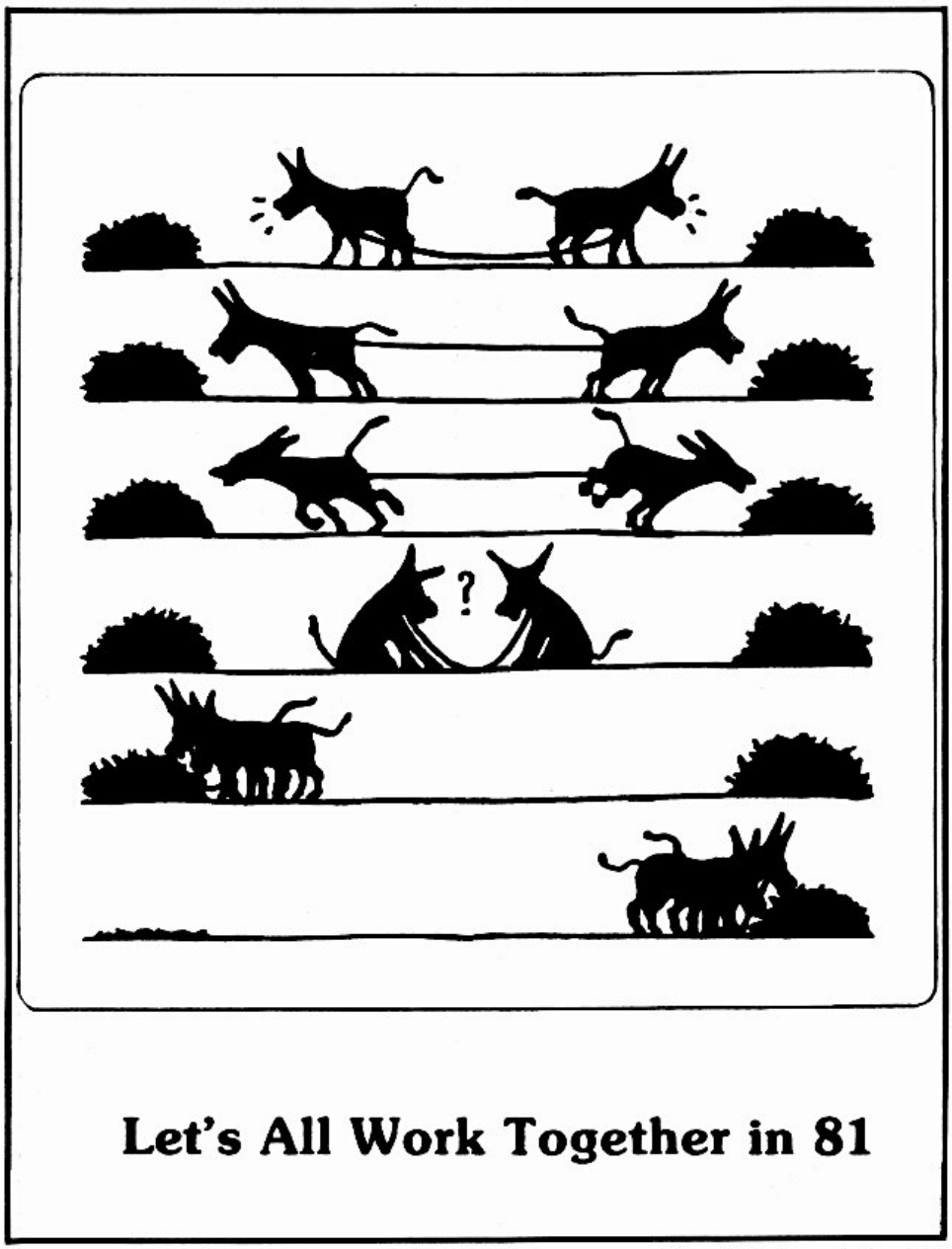
Radio amateurs have most interest in some of the derived units which have special names, such as the volt, watt, hertz, farad, ohm, henry and degree Celsius.

The definitions of the base units do change if scientists discover more accurate techniques and if the international meetings of legal and scientific bodies agree. The second is now based on the atomic properties of cesium and commercially available atomic clocks now keep time to better than 1 second in 3000 years — a considerable advance over previous clocks. Next year, as the result of better measurements of the speed of light and the frequency of light sources used as standards of length (wavelength standards), we can expect a new definition of the metre.

The results of such changes, which occur infrequently, is not to change the size of the base unit but to allow more accurate measurements of them.

Further information on standards of measurement can be obtained from CSIRO's Division of Applied Physics.

Yours faithfully,
R. R. Cook VK3AFW. ■



From S.A. Journal, Dec. '80

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- QTHR means address is correct as set out in the WIA 1979 Call Book.

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Icom 701 with RMI and desk mic., $810. VK1BH. Ph. (062) 88 6062 A.H., (062) 65 5385 Bus.

Yaesu FT227RB with memory, little use, with mic. and mobile bracket, $250, ONO; Philips 3 in. oscilloscope (valve type), $40; Solarex 300 mA solar panel, $70. Ph. Bill (02) 649 8931.

Yaesu FTV-650 6m Transverter, new spare 6146R, $165, ONO; 4CX250B amplifier, 2m, with power supply, new spare tube, $220, ONO. VK4ZKE. Ph. (07) 377 3785 Bus., (07) 201 3006 A.H.

Amateur Radio WIA Journals, April 1979 to December 1980, $5, plus postage. VK2DET, QTHR. Ph. (042) 84 3400.

Kenwood TS700A Multi-mode 2m Txcvr, e.c., 0459; Yaesu FT101, CW filter, fan, speaker, PA tubes, e.c., 0425; new 455 kHz mech. filter with carrier xtals, VK2ZIM TV converter, 432 MHz varactor tripler, unused, diode f/out, 2 GHz, 7.5W; new HP hot carrier diodes, 5082/2800; tubes QQE0/40, 815, 832A, 866, 807, 811, 803, 805; cabinet for linear, transformers, assorted microphones. VK3ARS, QTHR. Ph. (059) 86 4619.

Communications Rx, Trio TR59DS, with crystal calibrator, built-in spkr., antenna kit, spare valves, manual, $100; power/SWR meter (dual meters), Hansen FS5, $35; antenna noise bridge, Omega TE7-01, $20; grid-dip meter, Tradiper TE-15, $30; dwell/tachometer, Micronta auto 22-014A (dual 5 in. meters in case, etc.), for garage workshop, $35. VK2CE, QTHR. Ph. (02) 871 7758.

First Copy "The Listener-In", vol. 1, No. 1, January 10th, 1925; volume 1, Nos. 1-15 inclusive of "Popular Radio Weekly", February 25th, 1925. Offers. VK3VNQ, PO Box 27, Portland 3305.

Complete Kenwood Mobile Station: TS-120S Txcvr., AT-120 antenna tuner, MC-30S mic., MA-5 five band mobile antenna, VP-1 bumper mount, in orig. packing, 8 mths. old, all handbooks, $850, ONO. VK2NLQ, QTHR. Ph. (049) 33 4648.

Yaesu FT101 with blower, as new, $495; FT620 6m Txcvr., unmarked, $350, ONO. Bert VK3BH, QTHR. Ph. (03) 80 1204.

Yaesuft DX 401D Txcvr., with spare set finals, $350; Hustler 4BTV trap vertical antenna, $75; Hy-Gain TH3 beam and telescopic and wind-down tower, $245; CDE Ham II rotator and control, $140, or $750 the lot. Above items ex estate late A. H. B. Brodrik VK2HI. Contact H. Hendriks, PO Box 25, Wagga Wagga 2650. Ph. (069) 21 3781 Bus.

Any quantity of 30 min. and 45 min. Philips videocassettes to suit Philips 1500 VCR, some not used, some used for several hours, all good cond., $10, ONO. VK4ATM. Ph. Baralba 57 (State school) or write to T. W. Mitchell, C/o State School, Baralba, Q. 4702.

Drake SSR1 Barlow-Wadley Comm. Rx., 0.5 to 30 MHz, good cond., $150, or offer. Geoff VK2AZT. Ph. (069 42 1392.

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Kenwood TS820, little use, $850. VK2AMC, QTHR. Ph. (02) 807 4814.

Yaesu FT620, 50-54 MHz, SSB/CW/AM Txcvr., exc. cond., unmodified, /350. VK3ANY, QTHR. Ph. (051) 34 5384.

Argonaut 509 5 band QRP SSB/CW Txcvr., $290; multi-quartz 16 2m FM Txcvr. with rpts. 1-8, sim. 40 and 50, $120; SB-34, 80-15m SSB Txcvr., 12V DC, 110V AC, 240V AC, $220. Ph. (047) 74 8446, Bringelly, NSW.

Yaesu FT101B, gd. cond., CW filter, $500; Yaesu FT7, gd. cond., $350. VK4PM, QTHR. Ph. (074) 62 1021.

Decwriter LA36 Computer Printer, $650; Uniden 2020 80-10 Txcvr., with CW filter, mic, 240V and 12V leads, $550; Icom 502 6m SSB/CW Txcvr., $100; converted CB to 10m SSB Txcvr., $95; Argonaut 509 80-10 5W Txcvr., $300; Kenwood TR7200G 2m FM mobile with channels 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 40, $165. John VK2ASU, QTHR. Ph. (02) 639 7962.

Yaesu FTV650 6m Transverter with h'book and cables, $135; Yaesu FT200, full 10m, needs power supply, with h'book, $265. VK2BHO, QTHR. Ph. (042) 96 2142.

Yaesu FTDX401 Txcvr., 400W PEP, good order, with h'book, 600 Hz CW filter and mic., complete set of spare tubes. VK2AJT, QTHR. Ph. (044) 26111, (044) 22786 AH.

Txcvr. HF VH IDEN 2020, perfect cond., backlit numerical readout, used mostly listening, 240V AC/12V DC, 80-10m, AM SSB, CW, all accessories, $482; Hy-Gain 18 AVT 80-10m trapped vert. ant., $60. VK2NCJ, Glenbrook. Ph. (047) 39 1144.

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Icom IC701 HF Txcvr, complete with RM-2 remote control unit and home-made 240V power supply, with all cables and manuals, $1,000,ONO. Alan VK3BAY, QTHR. Ph. (03) 570 4371 AH, (03) 658 3373 BH.

Induction Motor, 5 h.p., 415V AC, $210; motor, 0.5 h.p., 440V AC, $100; 3 ph. mag. line starters (2), max. rat. 10 h.p., 400/440V AC, $50 ea.; 3 ph. mains switches (3), 500V AC, 20A, $30 ea.; all told $450. Elliot VK6NIE, 11 Antares St., Southern Cross 6426. Ph. (090) 49 1213.

Kenwood TS520S, DC-DC converter, MC-50 mic., spare driver and finals, $650; or with DG-5 digital readout, $800. John Caine VK2VZX, QTHR, or phone Binnaway (068 4412) and ask for 24.

Yaesu FT101E Txcvr, 2½ yrs. old approx., 40 hrs. total use, handbook, original packaging, etc., plus YD148 desk mic. and Dick Smith frequency meter up to 200 MHz, all in A1 cond., $750. Brian VK3NYS. Ph. (03) 369 1649 AH.

Yaesu FT101E Txcvr, plus YO148 mic., Oskerblock SWR200, as new, $625; Yaesu FRG7 Rx, exc. cond., in carton, $225. VK2BAL. Ph. (02) 44 4135.

Siemens Model 100 Teleprinter papertape reader punch (no keyboard), $300; TRAM XL5, modified, 10m, plus 2 antennae, $140; IC212 (215), nicads, crystals for 10 channels, $23; IC245, $340. John VK2WW, QTHR. Ph. (02) 546 1927.

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Circuit Diagram for Yaesu FT200 Txcvr. Col. McDougall VK2VRZ, "Woodlands", Coolamon, NSW 2701.

Schematic for Johnson Viking 352D. VK3VSM, 19A Mason Street, Regent, Vic. 3073. Ph. 470 1256, ask for Max.

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Antena, TH6 DXX or similar, any cond. Paul VK3VKZ, PO Box 100, Dromana, Vic. 3936. Ph. (059) 86 4493.

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Atlas 210X AC power supply. Milton Harris VK6HV. Ph. (09) 381 2475.

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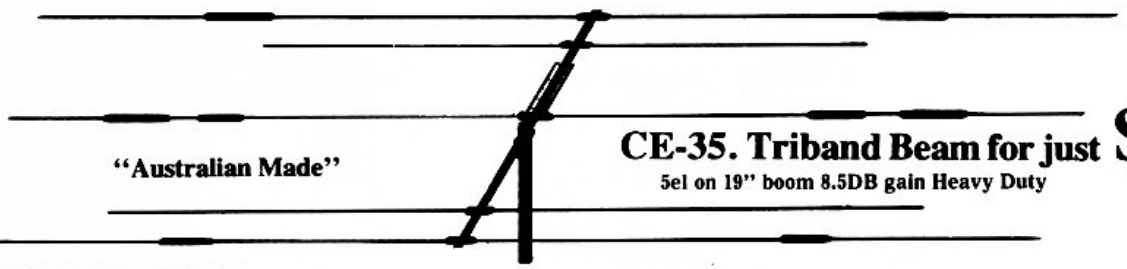

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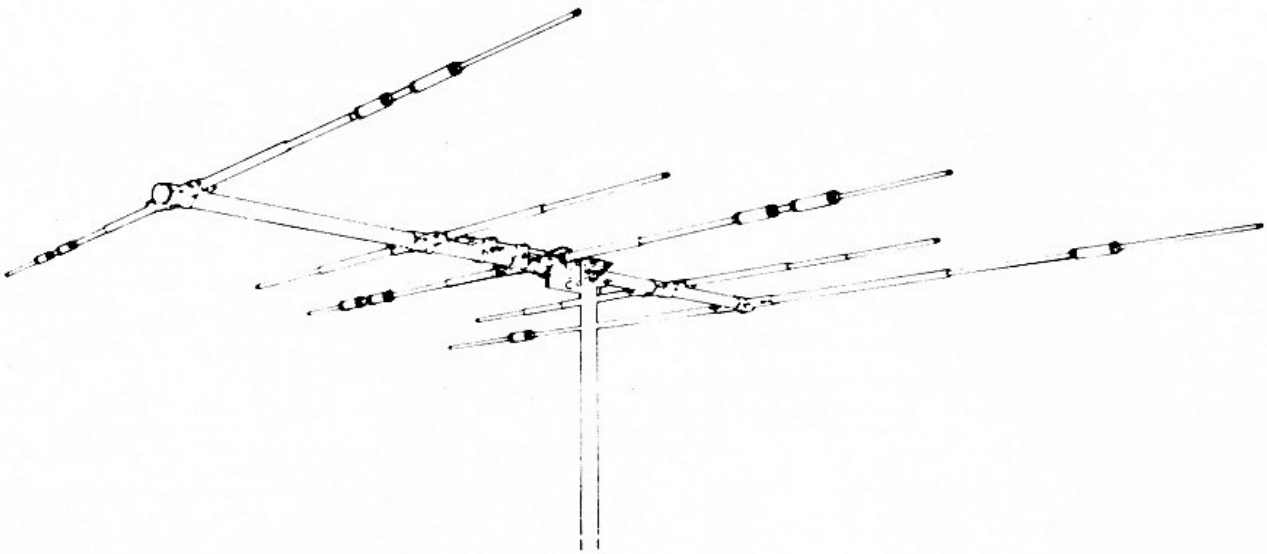

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